Fisher Maritime LLC
P.O. Box 894, Derry, New Hampshire 03038-0894, USA
www.fishermaritime.com • email@fishermaritime.com
Tel. +1 973 660 1116 • Fax +1 973 660 1144

CASUALTY ANALYSIS * May 3, 2022

Tiffany Provence v. United States of America, Crowley Government Services, et al. (re Mr. Juan Antonio Villalobos Hernandez)

Crowley Government Services managing the repairs to the *USNS Lummus* at Detyens Shipyard Inc. in 2018-2019

The author reserves the right to modify and/or supplement this analysis in the event additional pertinent documents or evidence becomes available.

* This analysis has been prepared for Hines & Gilsenan LLC, Att: Ryan Gilsenan, Esq., 1535 Hobby Street, Suite 203D, Charleston Navy Yard, North Charleston, SC.

Exhibit I

I PURPOSE OF ANALYSIS

[1] On behalf of the US Government ("Owner"), on August 24, 2018, Crowley Government Services, Inc. ("CGS") issued to Detyens Shipyard Inc. ("DSI") a ship repair contract for work to be accomplished on the *USNS 1st LT JACK LUMMUS (T-AK 3011)* ("vessel" or *"Lummus"*). The contract period commenced about November 15, 2018, and extended to July 1, 2019.

[2] The vessel is owned by the US Navy's Military Sealift Command. The vessel is operated for the government by CGS which organization prepares the technical specifications for the repairs and maintenance, and also acts as the government's coordinator of the project while the vessel is at the shipyard.

[3] DSI utilizes the services of outside labor agencies to provide additional workers when needed. This is a common practice in US shipyards. Since those non-employee workers were ultimately under the control of DSI, this analysis makes no differentiation between DSI employees and DSI subcontractor employees.[1]

[4] One of the contractually defined workscope tasks required the shipyard to remove the vessel's six lifeboats, and then repair the davits that support the lifeboats.[2] The davit repair specification called for, among other things, replacement of the wire ropes (wire "falls") used to raise and lower the lifeboats, as well as blasting and painting the davit structures, arms, and appurtenances.

[5] Another task required the inspection of the davits by a service engineer from the Palfinger company as an original equipment manufacturer (OEM) representative. As a result of that inspection, numerous areas on the davits were identified that required using flame cutters or grinding discs to remove corrosion, followed by the use of electric arc clad welding to replace "lost" metal on the davit structures. (DSI later submitted a contract change request, specifying the additional work to be accomplished to correct the deficiencies discovered during the inspection. CGS approved this change request, for which DSI was compensated.)

[6] Because the lifeboat falls had been removed prior to replacement, DSI secured each of the twelve davit arms with a temporary wire rope around structural elements to restrain each davit arm in its raised position while the repair work was being accomplished.

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[1] The OSHA investigation report of Sept. 6, 2019 includes the following determination at page 14: *"All the temporary service employees working at the shipyard were supervised by Detyens' supervisors and had control of them while working at the site."* Also, at page 100: *"All the temporary hiring companies working for the shipyard were supervised by Detyen's supervisors and Detyen's had control of them while working at the site."*

[2] See A-LUMMUS-WI 601 Lifeboat Davit Repairs & Falls Renew. N734 Rev'd.pdf. "Outfit, Furnishings & Habitability Item No. 601 Lifeboat Davit Repairs and Falls Renewal" 09MAR18

[7] On the morning of April 3, 2019, a shipyard worker was performing the correction of a corroded section of the starboard aft (No. 5) davit frame. Suddenly the temporary wire rope restraining the moveable arm of that davit came apart. The resulting sudden, uncontrolled lowering of the davit arm caused it to fatally strike the worker.

[8] The purpose of this analysis is to assess the factors that contributed to the uncontrolled lowering of the davit arm, with focus on identifying the role of the major parties involved in the ship repair project. The assessment may be useful in identifying the party responsible for the sudden failure of the restraining wire rope, which failure led to the fatality.

II CONCISE SUMMARY (more extensive summary at Section X)

[9] The root cause of the accident has been found, by this analysis as well as by OSHA and other qualified parties, to have been the presence of an errant electrical current that caused melting of most of the individual wires comprising the restraining wire rope in question. This overloaded the remaining individual wires, causing them to fail in tension. Other possible causes of possible failure have been examined and systematically ruled out.

[10] That errant electrical current, as well as any other event that could have affected the integrity of the wire rope, was a highly improbable event. It was a highly improbable event because the shipyard has many years of experience in implementing safety precautions to properly ground its welding machines and other electrical equipment at temporary locations on the ships that are undergoing repair.

[11] The method of restraining the davit arm in the raised position was accepted as mechanically and structurally safe and was in conformance with the method recommended by the davit manufacturer's Instruction Manual. It was also accepted by the Palfinger representative who had oversight of the davit repairs but did not request the addition of a temporary stopper bar or similar structural element in addition to the wire rope.

[12] There is no logical reason to place responsibility on a party for not having considered an event as improbable an unforeseeable as a stray electrical current when viewing the shipyard's method of restraining the davit arms. Accordingly, it was altogether reasonable that CGS personnel at the shipyard relied on the skills and expertise of the shipyard's rigging department to determine the method for restraining the davit arms in their raised position.

[13] From a contract management and project management perspective, per its contractual commitments and representations, DSI's contractually-defined accountability to provide a safe working environment for all persons involved in the ship repair project is neither shared with nor transferred to another party merely because it had been a customer in the on-going ship repair project.

III ACCIDENT SETTING

[14] The *USNS Lummus* carries three lifeboats on each side of the deckhouse, for a total of six lifeboats. The technical Specifications of March 9, 2018 prepared by CGS address the Work to be accomplished on the *Lummus* by DSI pertaining to the davits. Section/Item **601** is titled "Lifeboat Davit Repairs and Falls Renewal." The Specifications at Item 601, section 7.1 requires the Contract to *"Remove all lifeboats from the davits and stow ashore on Contractor furnished cradles within 24 hours of vessel arrival at Contractor's facility."* Subsequently, section 7.2, requires the Contractor to *"Remove and dispose of the lifeboat falls"*.[3] Section 7.9 required the Contractor to *"Provide services of a PALFINGER service representative to inspect the lifeboat davits and provide a condition report of findings."* Then at section 7.13 the Contractor is required to provide and install, with appropriate fittings, replacement lifeboat falls.

[15] Per the manual issued by the supplier of the lifeboat davits when the ship was constructed, *"this equipment is designed to launch, retrieve and stow a lifeboat. The davit consists of a pair of crescent shaped arms mounted on rollers, installed in a pair of inclined trackways, in which the arms travel from the inboard to the outboard positions. The boat is lowered to the water by gravity under control of the centrifugal and manual brakes on the winch. The boat is hoisted from the water and the arms are brought to their stowed position by the winch which can be hand cranked in the event of a power failure."*[4]

[16] Each of the six lifeboats aboard the *Lummus* are stowed, launched, and retrieved using a pair of roller gravity davits, which are diagrammatically illustrated in the stowed and embarkation positions in **Exhibit FM-1** on the next page. Each davit consists of two major parts: a frame and an arm. The davit's frame is fixed, welded to the ship, primarily consisting of inclined channel bars. These types of davits allow for launching of lifeboats using only gravity.

[17] Generally speaking, as the falls pay out of the winch drum, the davit arm, on rollers, moves down the track within the davit frame until it is stopped where the davit frame meets the embarkation deck outboard of the side of the ship. The lifeboat can then be lowered without contacting the side of the ship. From this point (typically after the crew is secure aboard), the lifeboat would begin to lower down alongside the vessel as the falls continue to pay out. (The electric winch is used during the hoisting operation to return the lifeboat to the stowed position.)

[18] Before installing the new lifeboat falls, the Contractor was required to perform repairs to the davit frames and arms, and as would later be expanded by the Palfinger inspection reports, as well as to renew winch system components. In order to accomplish those repairs, the davit frames and arms had to be made accessible for those repairs.

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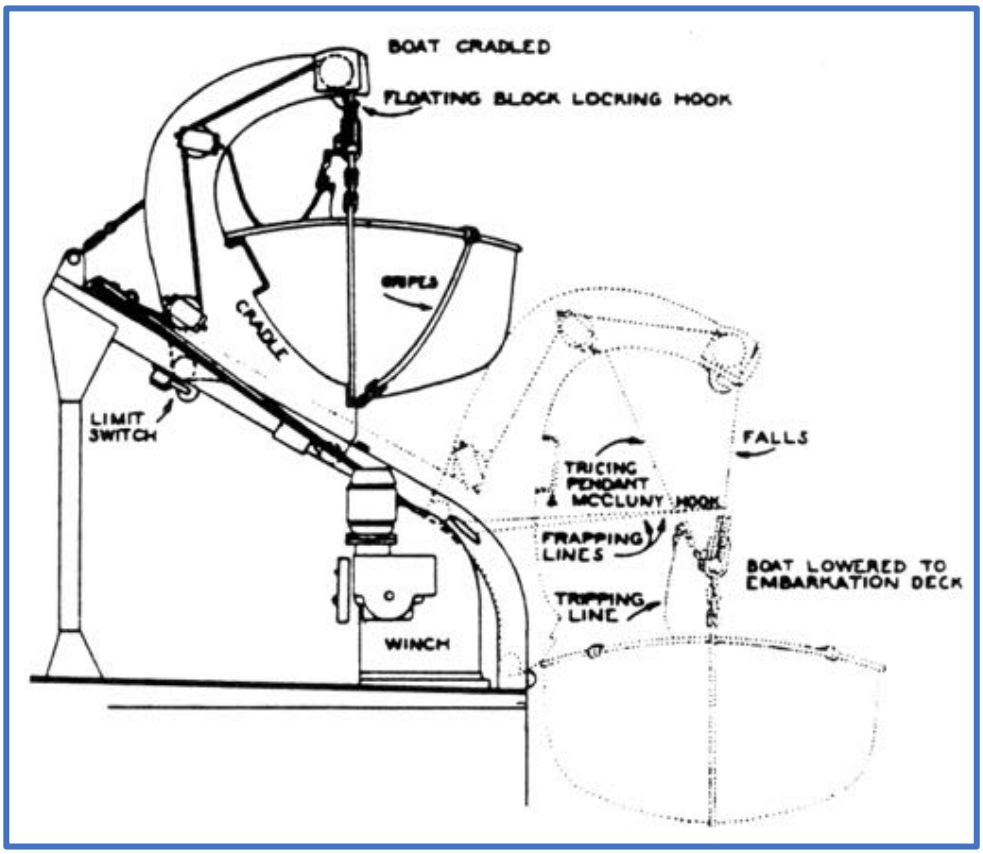
[3] Lifeboat falls are wire ropes supporting the lifeboats, suspended below the davit arms.

[4] Marine Safety Equipment Corporation, Book No. 6167-76, June 1984.

Exhibit FM-1 – Roller Gravity Davit Diagram[5]



[19] After removing the lifeboats in November 2018, the shipyard secured the davit arms in their raised position (without the lifeboat). But since the lifeboat falls that are used to raise the davit arms were to be removed, each lifeboat davit arm in the raised position had to be restrained from falling back into the lowered position by other means once the falls were removed. Using the same method as employed previously on numerous other projects, DSI restrained the davit arms in their upper position by use of wire ropes looped around part of each davit arm by one end of the wire rope and looped around a part of the fixed davit frame by the other end of the wire rope.

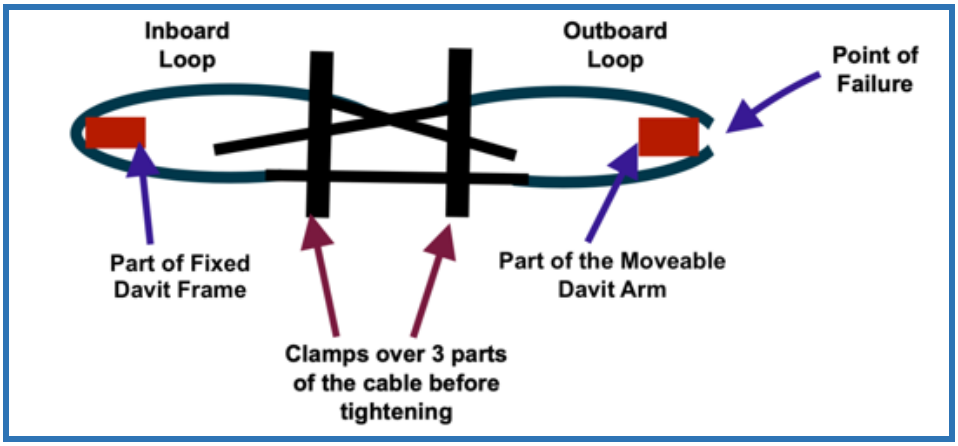
IV ACCIDENT DESCRIPTION

[20] The forward and after davits serving each lifeboat station are structurally independent of one another. When the lifeboat falls are not attached, each of the two davit arms can be raised or lowered without having to move the other. The two arms of the aft starboard lifeboat davit

[5] *American Merchant Seaman's Manual,* edited by William Hayler. 6th ed., Centreville, Cornel Maritime Press, 1994. p. 10-15.

had been restrained in the raised position by 3/8" wire rope fastened by clamps to create two loops. One loop was placed around a part of the davit arm, and the other loop was placed around a structural part the davit frame. This was the same method as successfully employed previously on other ship repair projects and on the other 11 davit arms on the Lummus. The two loops overlapped, and were secured together by two Crosby clamps, each clamp enclosing three parts of the wire rope. This arrangement is diagrammatically depicted below in **Exhibit FM-2**. The observed point of failure is also identified in this Exhibit.

Exhibit FM-2 -- Diagram of Clamping the Restraining Wire rope



[21] The actual result of such clamping is shown below in **Exhibit FM-3** below, taken from a portion of DSI's Photo No. 000181. The outer loop -- the one that parted later -- passed around part of the davit arm's structure. The inner loop passed around part of the davit frame that is welded to the side of the deckhouse.

Exhibit FM-3 -- Clamped ends and middle of Restraining Wire rope [6]

[6] Also see photographs DSI 000260, 000261 and 000262 for additional views of this configuration.

[22] On the morning of April 3, 2019, Mr. Juan Antonio Villalobos Hernandez ("Hernandez") was working on the main deck of the *Lummus* below the after arm of the aft starboard davit, temporarily sitting on a bucket atop the winch housing. The work he was doing was to repair corroded portions of the davit frame. Using a grinding wheel as needed, he would remove corroded sections or surface areas. If that process created gouges, he would clad weld new metal into the gouges to restore the strength of the davit in that area.

[23] Suddenly, the restraining wire rope parted, allowing the davit arm to fall into its unrestrained position. It struck Mr. Hernandez, causing fatal injury.

V CAUSAL ANALYSIS

[24] A determination of the root cause of the accident is based on the available physical evidence and the contemporaneous observations of persons at the scene. The analysis can rely on facts reported by others but cannot be built or rely on the analyses and conclusions of others. Accordingly, this causal analysis first identifies the relevant facts, and then presents the reasoning that leads to conclusions. The facts are reviewed in three categories: (i) scene factors; (ii) material factors; and (iii) observed factors.

[25] V.1 Scene Factors for Causation:

The DSI accident report [7] states that the accident occurred at 09:20. Persons rushed to the site upon hearing a noise and shouts of others who already arrived there. What they saw is succinctly described by Mr. Hubert L. Lynch, the Hull Shop Supervisor, whose written statement shows that Mr. Hernandez was *"pinned between a flatbar and the davit arm".* [8]

[26] OSHA was notified by 09:30. DSI's accident report states that, *"Incident scene was immediately secured both forward and aft. Access was restricted and no materials/equipment was removed from the area. DSI EHSO personnel remained as security of area until relieved by North Charleston Police Department Officers."* This is the basis for accepting OSHA post-accident observations of the scene.

[27] The accident description, above, includes identification of the placement of the wire rope that parted or failed, and some of the peripheral information. The pre-accident position of Mr. Hernandez is reported in OSHA Reported Inspection Number 1391322. The work that Mr. Hernandez was assigned required his use of welding equipment. Based on the OSHA inspector's

[7] DSI accident report # 9093-1, 04 March 2019, DSI 000282- 285

[8] Lynch statement, DSI 000276.

observations at the secured scene, including his discussions with on-site personnel, the OSHA report states,

> *It's unclear if he [Hernandez] was grinding, welding, or setting up to weld, but at approximately 09:20 hrs. he was sitting (according to the only eye witness he was sitting facing port) when the wire rope suddenly snapped and the davit came down from the "stowed" to the "swung-out" position. …*
>
> *Is unclear what Mr. Villalobos - Hernandez was actually doing at the time of the accident. One employee* [redacted] *said he (the victim) had clad welded some areas and was getting ready to grind. The* [redacted] *said that the victim was starting to weld and was not grinding. Others said he was grinding and had not started welding yet.*

[28] That is, the only eye witness had not seen whether Mr. Hernandez was grinding, welding, or taking other actions. Thus, welding cannot be ruled out.

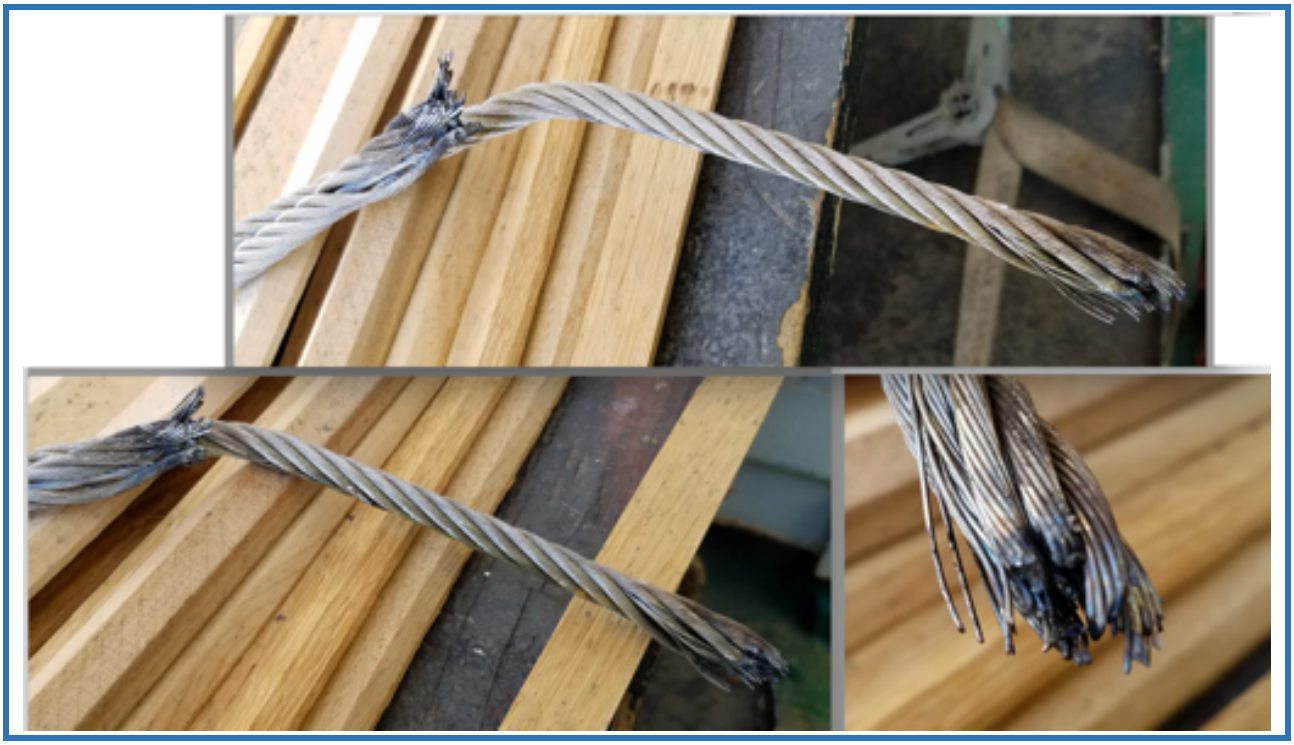
[29] **V.2 Material Factors for Causation:**

The wire rope had parted. There are six possible causes for a wire rope to part. Each of them is considered in order to rule out as many of the possibilities as appropriate based on the remaining physical evidence:

(a) corrosion;
(b) shearing by other structures or implements;
(c) cutting by flame;
(d) excess physical tension;
(e) electrical current from direct contact with welding rod; or
(f) other sources of electrical currents.

[30] The parted ends of the involved wire rope are shown in the contemporaneous photos of **Exhibit FM-4** on the next page. All parts of the involved wire rope were removed from the scene and controlled by OSHA. OSHA's Salt Lake Technical Center ("SLTC") examined and photographed those sections, with particular attention to the two ends of the parted section of the wire rope. The contemporaneous photographs, coupled with the close-up photographs in Figures 8 and 9 in the Technical Center's report of July 10, 2019, are the basis of the following observations. Note that the wire rope is classified as 7 x 19, meaning that there are seven (7) major strands, each having 19 wires, for a total of approximately 133 wires. These are seen in Figure 7 of the SLTC report.

Exhibit FM-4 -- Parted Ends of Restraining Wire Rope [9]



[31] (a) **Corrosion:**

If a sufficient number of wires within the wire rope have experienced considerable corrosion, the total strength of the wire rope is compromised. In that case, tension in the wire rope that is far less than the original strength of the wire rope could be sufficient for the wire rope to part at the location of such corrosion. However, the photographs in **Exhibit FM-4** and at Figures 8 and 9 of the SLTC report do not show any corrosion at the location of the parting. Thus, this possible cause of the wire rope parting is ruled out.

[32] (b) **Shearing by other structures or implements:**

In order for a wire rope to be sheared, considerable local pressure has to be exerted by the sharp edge of the shearing mechanism on the outside strands. That local pressure causes the shape of the wire rope to be permanently distorted (i.e., pinched) perpendicular to the run of the wire rope. This occurs because the shearing cannot occur until the material's resistance to shearing is exceeded beyond its elastic limit by the force of the shearing mechanism. Again, the photographs in **Exhibit FM-4** and in Figures 8 and 9 of the SLTC report do not show any distortion (pinching) that is perpendicular to the run of the wire rope. Accordingly, the parting of the wire rope was not caused by shearing against a flat bar, davit structure or by any other mechanism.

[9] Source: photographs DSI 000257, 000258, 000259.

[33] (c) **Cutting by Flame:**

The cutting of steel by a cutting torch using acetylene and oxygen is a routine process in shipyards. The cutting is accomplished by the high temperature of the flame melting the steel at the cut line causing tiny segments of it ("slag") to fall away, until the strength of any steel remaining across the cut line is insufficient to remain in place. Thus, if this wire rope had parted due to flame cutting, nearly all the ends of the individual wires would show signs of having been melted, and the remaining portions of those that had been severed would be melted into a mostly homogenous mass. However, the cited contemporaneous and SLTC photographs show that there was no wide-spread melting across the entire wire rope. Nearly all the individual stands and their wires are separately visible. Moreover, some of the parted wires stick out beyond the bulk of the others. Thus, the parting was not caused by flame cutting.

[34] (d) **Excess Physical Tension:**

Excess tension is the application of a force that creates a stress in the metal where the force (in, say, pounds per square inch ["psi"]) exceeds the elastic strength of the metal. Elastic strength means that when tension is released, the metal returns to its original, unstretched shape. But when the tension in psi exceeds that elastic strength, there will be permanent stretching of the material. However, at the same time, since the volume of material is not changing, the material will "neck" to a narrower cross section as it gets longer. It will remain that way after the tension is released. This permanent necking is the precursor to failure in tension.

[35] A necked wire rope, in which nearly all the wires and strands (but not necessarily all of them) have permanent necking is indicative of a failure due to excess tension. Once again, the cited contemporaneous and SLTC photographs (**Exhibit FM-4** and in Figures 8 and 9 of the SLTC report) do not show any permanent necking of the wire rope, its seven strands or nearly all the individual wires, with exception of *"a few of the wires [that] failed in tension demonstrated by necking and shear failure"*. Excess physical tension is thereby eliminated as the primary cause of the wire rope parting. Instead, as described in Section V.3, below, the tensile failure observed in only a few of the wires occurred in the final moments prior to total failure when the weight of the davit arm overcame the strength remaining in the few wires that were not already compromised by another mechanism.

[36] (e) **Electrical current from direct contact with welding rod:**

Welding two pieces of steel together using electricity is achieved by intentionally causing electrical current to pass from the welding rod to the nearby steel in the form of an electrical arc that heats the steel to its melting temperature. Because the electrical current is direct (not alternating), the ions flow in one direction only, causing particles of the welding rod to be deposited onto the melted steel. As the current is removed from that area, the melted steel cools and re-forms into hard steel. If two pieces of steel are in close contact at the electrical arc, then the edges of both pieces melt and then re-form into a single piece, i.e., a welded joint. Clad welding, on the other hand, uses only the welding rod material to be deposited onto the single piece of steel.

[37] Both purposes of "arc welding" use a welding rod for the temporary formation of a pool of molten steel, that re-forms into a homogenous shape once the electrical arc is moved elsewhere. Since clad welding was possibly going to be used on the davit, this possible cause of failure -- the accidental touching of a welding rod to the wire rope -- might be considered. However, the cited contemporaneous and SLTC photographs (**Exhibit FM-4** and in Figures 8 and 9 of the SLTC report) show that no homogenous pool of previously melted steel was formed at either of the parted ends of the restraining wire rope, thereby eliminating this possibility from further consideration.

[38] (f) **Other Sources of Electrical Currents:**

It is possible that failure of the restraining wire rope resulted from an uncontrolled source of electrical current. The flow of electrons in electricity is similar to the flow of fluids in mechanical systems in that flow occurs when a connection exists between an area of high potential and an area of low potential. For example, water flows through a garden hose as it travels from an area of high pressure (e.g. the hose tap) to an area of low pressure (e.g. an opened spray nozzle). Electricity similarly flows from areas of high electrical potential (voltage) to areas of lower potential (the lowest potential is a ground).

[39] In the instance of the subject davit arm assembly, the restraining wire rope was looped around the two parts of the davit structure: frame and arm. The subject wire rope could have acted as the path for electricity to flow due to being the connection between a source of higher electrical potential and the grounded fixed davit frame. (The fixed davit frame structure was grounded because it was welded and electrically bonded to the structure of the vessel.)

[40] The source of the electrical potential in this instance could be, among other possibilities, (i) an ungrounded or improperly grounded welding machine causing the formation of an internal electrical current in the restraining wire rope, or by (ii) the restraining wire rope contacting a power cable at a point of faulty insulation.

[41] Regardless of the source of electrical potential, this scenario can lead to failure due to the excessive flow of electricity damaging the wire rope. Failure occurs when this flow (i.e. current) exceeds the current carrying capacity of the material, which is typically defined as *"the amperage a conductor can carry before melting either the conductor or the insulation. Heat, caused by an electrical current flowing through a conductor, will determine the amount of current a wire will handle."*[10] The "material" of concern is the cross sectional area where two items are in contact with one another.

[42] Under this electrical failure scenario, the wire rope could increase in temperature where there was limited electrical connectivity to a grounded structure. This happens because the limited

[10] "Current Carrying Capacity of Copper Conductors." *Multi/Wire rope,* www.multiwire rope.com/ resources/reference-data/current-carrying-capacity-of-copper-conductors/. Accessed 07 March 2022

cross sectional area of connectivity would increase the electrical density (amps per square inch) leading to a very high temperature arc, or until the material of the wire rope at that location began reaching its melting point as excessive current passed through the limited area of the connection.

[43] **V.3 Observed Factors for Causation:**

The photographs of the parted ends of the wire rope that have been reviewed (**Exhibit FM-4**, above) show that some of the individual wires failed by melting and fusing with adjacent wires, some melted without fusing to adjacent wires, and others failed in tension.

[44] The annotations pertaining to physical characteristics of the parted wire rope, as shown in the photographs at the OSHA SLTC report's Figure 8 includes: *"Fused wires"; "Electrical damage"; "Melting"; "Carbon deposits"* and *"Tensile Failure".*

[45] The possibility that Mr. Hernandez was welding or about to weld at the time of the accident has not been ruled out.

> *Is unclear what Mr. Villalobos-Hernandez was actually doing at the time of the accident. One employee* [redacted] *said he (the victim) had clad welded some areas and was getting ready to grind. The* [redacted] *said that the victim was starting to weld and was not grinding. Others said he was grinding and had not started welding yet.* [OSHA Reported Inspection Number 1391322]

[46] It is equally possible that Mr. Hernandez or one of his colleagues welded on the davit structure in the prior day(s) with an ungrounded circuit, weakening the wire rope. Inasmuch as the wire rope parted where it was looped around part of the davit arm, the davit arm must have contacted a source of high electrical potential that could have included (but is not limited to): [11]

(i) the restraining wire rope contacting a damaged electrical cable/extension cord;
(ii) improperly using the wire rope as part of grounding path during welding operations; or
(iii) contact of the wire rope with the davit arm when the was arm exposed to high electrical potentials such as those described in items (i) and (ii).

[47] When some of the individual wires within the wire rope melted, the electrical current would have then passed through a fewer number of wires, thereby increasing the power density flowing through the remaining wires, hastening their melting. At that point the wire rope parted as the weight of the roller-mounted davit arm exceeded the weight-carrying capacity of the remaining part of the wire rope. This scenario is confirmed by OSHA's previously noted

[11] Lightning strike is excluded from consideration in this instance.

observation that some of the individual wires failed by melting and fusing with adjacent wires, some melted without fusing to adjacent wires, and others failed in tension.

[48] This is further corroborated by an independent examination, per the February 2022 report of T. Wenzel and D Brinkley at Accident Reconstruction Analysis, PLLC.

> *Examination of the ends reveal that both discoloration and resolidified metal at/near the fracture ends of the individual wires. … The discoloration and resolidified metal at fracture indicates that a thermal event had occurred at some point in time that compromised the strength of the wire rope. Not all of the wires were melted by this thermal event. Some of the wires showed evidence of overload failure indicating that some percentage of the wires fractured at the time of separation.* [Source: Wenzel 000008]

[49] Those observations should be considered concurrent with the following. The previously cited OSHA Reported Inspection Number 1391322 includes the following, based on the OSHA inspector's on-site observations shortly after the accident.

> *[A]t Detyens Shipyard, Inc. (DSI) in the past without incident, certainty of the grounding system employed was deemed appropriate. Welding machines were grounding to deck/bulkhead as required by FY-19 NAVSEA STANDARD ITEM 009-12 "Weld, Fabricate and Inspect." The vessel was grounded from the pier to the vessel and waterborne thus providing an "earthen ground."*
>
> *[However, regarding the] USNS 1ST Lt. Jack Lummus, Starboard side Life Davit # 6: On or about April 3, 2019 an employee working on the davit without a proper grounding circuit exposed the employee to the hazard of the generation of an arc.*

[50] That is, immediately after the accident, the OSHA inspector identified an improper grounding circuit. The shipyard's safety officer, James Lyles, stated that a risk of improper grounding of a welding machine could result in *"Shock, the ground can go anywhere, basically."* [dep'n 116/7]

[51] Examination of the DSI contemporaneous photographs (**Exhibit FM-4**) and those in Figures 8 and 9 of the SLTC report shows that nearly all the individual wires are seen to have separated at slightly different points due to melting, leading to a near-total loss of strength of the wire rope. The few remaining wires were immediately overloaded, stretched and failed in tension.

[52] **V.4 Conclusion for Causation:**

Having eliminated all other causes of the parting of the wire rope, the only explanation is that failure of the wire rope was caused by errant electrical current. This was caused by either (i) an ungrounded or improperly grounded welding machine or other shipyard equipment caused the formation of an electrical current in the wire rope that led to a short circuit between the wire rope and nearby structure, or (ii) the restraining wire rope or davit arm contacted an energized

electrical cord at a point of faulty insulation. The resulting short circuit either (a) created an arc that vaporized a very short section of most of the wires within the wire rope causing the parting or, (b) without a visible arc, the short circuiting caused the progressive melting of portions of the wire rope, leading to its ultimate parting.

[53] Accordingly, it is concluded that the only feasible cause of the parting of the subject wire rope was the direct result of allowing the development of improper and/or insufficient electrical connections and insulations by the shipyard, allowing an errant and damaging electrical current to form a between the restraining wire rope and the davit arm's structure. [12] The wire rope did not part due to material degradation, being sheared, fatigue from repeated bending, insufficient mechanical clamping, or inadequate strength of the wire rope, but only because it was adversely affected by an uncontrolled electrical current flow.

VI SHIP REPAIR CONTRACT

[54] The contract between CGS and DSI is extensive. The following excerpts appear to be most relevant to identification of the party that is responsible for the sudden failure of the restraining wire rope, which failure led to the fatality. The selection of these excerpts should not be interpreted to reduce or mitigate the relevance of other parts of the contract, as well.

[55] The CGS Commercial Procurement Clause at Part 1(see page 2 of 20, DSI 000022) states:

> *SER 01 - Contractor Status/Workmanship*
>
> *Except as otherwise provided in the Specifications, the Contractor, as an independent Contractor and not as an agent or employee of CGS or the Owner, shall furnish all labor, materials, supplies, equipment, facilities and services required to perform and fully complete … all work covered by the Specifications … . … All workmanship and / or material shall be the best quality and in accordance with best commercial marine practices. …* [underline emphasis added].

[56] In addition to complying with best commercial marine practices, the shipyard also committed to compliance with OSHA and other regulations. The contractually included CGS Commercial Procurement Clause at Part 1(see page 3 of 20, DSI 000023) states:

[12] It is possible that the arcing or short-circuiting may have occurred several prior brief times as the restraining wire rope was moved or as the power source was turned on and turned off. There is no means of determining if that occurred. Nevertheless, the resultant conclusion remains the same.

> *SER 05 - OSHA/EPA Regulations Applicable*
>
> *The Contractor agree to comply with all applicable safety, health and environmental regulations pertaining to ship repair during the entire performance period.*

[57] The contract specifications General Requirements Item No. 0001 include a more-detailed set of obligations regarding, among other items, the temporary rigging that is needed to accomplish the Work.

> *3.3 The Contractor will provide all labor and materials necessary to accomplish all items in the work package. The Contractor will rig, unrig, connect and disconnect stage, unstage, and remove and replace any interference as required to accomplish each item of the work package.* [Vessel Defendants 960]

[58] The same General Requirements include the requirement that the General Technical Requirements apply to all work accomplished.

> *4.1 Within the scope of this work package, each work item will be accomplished in accordance with all appropriate General Technical Requirements (GTR), whether stated or not in the individual work items, which form an integral portion of this contract. In addition, any changes there to will be accomplished in accordance with the General Technical Requirements.* [Vessel Defendants 960]

[59] Those General Technical Requirements, section 3.6 Guidance Level, provides, *"the shipyard determines how to do the work."* [Vessel Defendants 1164]

[60] The CGS Commercial Procurement Clause at Part 1 states:

> *SER 08 - Contractor Safety Responsibilities:*
>
> (a) *The Contractor shall inspect all work areas and use its best efforts to prevent accidents, injury or damage … in and about the Work covered by the Specifications … . Contractor further agrees that … it will notify CGS at once if any condition is or creates and unsafe, dangerous, or improper place in which to work, and assume the responsibility for seeing that such condition is corrected before proceeding with the Work.* [Page 4 of 20, DSI 000024]

[61] Accordingly, DSI took on the responsibility to perform all rigging and to *"notify CGS"* of the presence of any potentially hazardous situation that would be created by the contractually defined Work that was beyond the shipyard's appreciation of normal shipyard practices, and in particular, outside of *"best commercial marine practices"*. Moreover, DSI had the responsibility to ensure that such condition was corrected *"before proceeding with the Work."* This clause allows for the possibility that the shipyard might determine that a correction to the specifications

has to be effected by CGS -- if it is CGS's responsibility -- before the shipyard could continue the work. [13]

[62] However, as shown below in Section IX pertaining to the Lack of Latent or Hidden Danger, the shipyard's chosen procedure for temporarily securing the davits in a raised position had been established and successfully used on many prior occasions. The shipyard had no need to ask CGS to correct conditions or alter the workscope prior to commencing that work.

[63] Furthermore, the shipyard had the opportunity to ask questions or seek clarification from CGS on any aspect of the repair specification and did so by letter dated August 1, 2018. [Vessel Defendants 1019-1024]. Although the shipyard asked questions regarding various aspects of the overall project in that letter, the shipyard presented no questions and sought no clarification as to how to perform the davit repairs.

[64] Section 601 of the Specifications, Lifeboat Davit Repairs, at paragraph 5.2 required DSI to utilize the services of Palfinger during accomplishment of the davit work.

> *5.2 The Life Boat and Davit manufacturer technical service representative (PALFINGER) shall be provided during all renewals and repairs.*

[65] Further, paragraph 7.9 required the Contractor to *"Provide services of a PALFINGER service representative to inspect the lifeboat davits and provide a condition report of findings."* [Vessel Defendants 969]. Palfinger did, in fact, provide such services, as noted in the DSI response to Plainatiff's Interrogatory No. 14 states, *"Palfinger Marine USA, Inc.'s representative Blaine Brown, directed the lifeboat davit repair work package."*

VII PALFINGER CONTRACT AND MANUAL

[66] As mentioned in Section I (Purpose of Analysis), one of the contract tasks assigned to DSI was the required condition-inspection of the davits and witnessing of testing by a service representative from the Palfinger company. [14]

[67] In the course of preparing and accomplishing its assignments, the Palfinger representative relies on manuals that pertain to the specific items of equipment that it will be

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[13] Note that the specifications for the corrective work of corrosion removal and clad welding on the davits were written for the Change Order by DSI, based on the Palfinger reports and recommendations. That is, CGS did not prepare the specifications for the work that Mr. Hernandez was engaged on.

[14] Section/Item **601** is titled "Lifeboat Davit Repairs and Falls Renewal." The Specifications at Item 601, section 7.9 required the Contractor to *"Provide services of a PALFINGER service representative to inspect the lifeboat davits and provide a condition report of findings."* Specification Item **602** Lifeboat Weight/Trip Release Test, §7.3: *"Provide services of a PALFINGER Technical Services Representative to inspect the releasing gear and witness all testing."*

inspecting or servicing. In this instance, an Instruction Manual prepared by Marine Safety Equipment Corporation in June 1984 (MASECO Book No. 6167-76) was central to the supply and installation of the gravity davits on the *Lummus* when the ship was constructed at Quincy Shipbuilding in Massachusetts in 1984-86.[15]

[68] Part of the davit mechanisms is a "stopper bar" that is hinged to each davit base. It can be lowered across the channel bar in which the rollers of the davit arm move, and secured in place by a toggle pin. When the lifeboat is in its secured position during vessel operations, the use of the stopper bar allows the strain on the falls to be eased, preventing gradual stretching of the falls.[16] That is, the use of the stopper bar, or some other structural element placed across the tracks of the davit base, is needed to relieve the stress on the falls when the falls are in place. The removal of the stopper bar is part of the lifeboat launching procedures.

[69] Moreover, the original specifications require blasting and painting of the entire the davit structure after all structural repairs have been completed. The stopper bars were themselves to be removed and reconditioned and therefore could not be used as a primary or secondary securing mechanism during the repairs.

[70] However, the same MASECO Instruction Book clearly advises that an alternate mechanism is needed to restrain the davit arm when the falls are not present. Specifically, the Instruction Book for the davits states in capital letters,

> *THE DAVIT ARMS SHOULD BE RESTRAINED WITH A CABLE OR CHAIN UNTIL INSTALLATION OF THE TRACKWAYS AND REEEVING OF THE WIRE ROPE HAS BEEN COMPLETED.* [Page 9, Vessel Defendants 1251]

[71] That is, the stopper bar or an equivalent structural element is not required to be secured across the track for the davit arm when the falls are not present and attached. Inasmuch as the stopper bars would themselves be reconditioned, blasted, and painted as part of the overall davit repairs, they were not available for use in their usual manner. The lack of the use of a stopper bar or equivalent structural element was also consistent with the MASECO Instruction Book as evidenced by the fact that the *"Palfinger Marine USA, Inc.'s representative Blaine Brown, directed the lifeboat davit repair work package."* The Palfinger representative did not ask DSI to install such temporary items, though the absence of such a device was patently observable when he was assessing the condition of the davit to prepare his recommended corrective instructions. Since the replacement of the falls was contractually required, the shipyard, based on decades of

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[15] MASECO is owned by Palfinger per their website: https://www.palfingermarine.com/en/service/our-brands

[16] See Operating Instructions at page 13 of the cited MASECO book, at Vessel Defendants 1255.

experience without incident, used a cable to restrain the davit arm until the new falls were installed and tested.

VIII NIELSEN REPORT

[72] A report pertaining to this matter has been prepared by Mr. Gerald S. Nielsen of Ocean Ridge Maritime Consulting LLC, dated February 14, 2022. He summarizes his finding by stating, *"It is the author's expert opinion that both Detyens Shipyards, Inc. and Crowley Government Services Inc. failed to provide and maintain a reasonably safe workspace for Mr. Villalobos-Hernandez on the USNS 1st LT Jack Lummus on 3 April 2019."* [p.5, Nielsen 00005] However, the assertion is undermined by several anomalies and inconsistencies with the available evidence, which are explored in the following subsections of this report.

[73] VIII.1 Nielsen's Opinion of Wire Rope Strength and Clamps:

The Nielsen report presents four opinions, of which the first two are these:

> *Opinion 1: Crowley's contract specifications did not adequately detail proper methods for securing lifeboat davit arms on the USNS 1st LT Jack Lummus and Detyens Shipyards, Inc. did not utilize safer customary securing methods to secure lifeboat davit arms for shipyard service.*
>
> *Opinion 2: The methods used to secure the lifeboat davit arms on the USNS 1st LT Jack Lummus were not in compliance with manufacturer's instructions, OSHA standards, or good rigging practice and created a hazard that led to the injury and death of Mr. Villalobos-Hernandez.*

[74] After describing and documenting his review of contract documents, standards, practices, testimony, on-site photographs and other evidence, Mr. Nielsen writes:

> *Based on the above information and experience in the shipyard and maritime industries, it is the author's opinion that DSI's use of wire ropes and wire rope clips to secure the lifeboat davit arms on the USNS Lummus violated good industry practice, manufacturer's instructions, and OSHA standards. Furthermore, had the USNS Lummus lifeboat davit arms been properly secured or had readily available alternative securing options been chosen … the hazardous condition that caused the injury and death of Mr. Villalobos-Hernandez on 3 April 2019 would have been avoided.* [p.23]
>
> *It is further the author's opinion that DSI created a hazardous condition when it restrained the lifeboat davit arms in the manner that was chosen.* [p.18]

[75] That is, Mr. Nielsen is stating that the violation of applicable standards and good shipyard practices for temporarily securing the davit in its raised position *"caused the injury and*

death of Mr. Villalobos-Hernandez." The validity of this is discussed in the next several paragraphs.

[76] **VIII.2 Wire rope Strength and Clamp Usage were Adequate:**

Mr. Nielsen's report does not cite any evidence that the wire rope parted or failed due to excessive tension in the wire rope (i.e., by being subjected to a load greater than its breaking strength). Neither does he cite any evidence that the wire rope slipped through inadequate clamps. For all six sets of twin davits on the vessel, none of the wire ropes slipped through the clamps. Similarly, for all six sets of twin davits, none of the temporary restraining wire ropes independently parted or broke in tension greater than the strength of the wire rope. Also, Mr. Nielsen does not show or refer to any evidence that the wire rope was sheared by the sharp edge of the davit structure or any other shearing mechanism. The shipyard's use of a wire rope looped around structural elements to secure the davit arm in the raised position, and the use of clamps (wire rope clips) were, in fact, structurally and mechanically adequate for the task of preventing the movement of the davit arm when not subjected to unforeseeable (and invisible) electrical current, as evidenced by the history of the shipyard's use of that form of restraint.

[77] The failure of the restraining wire rope, as described in the above Section V, Causal Analysis, was a consequence of errant electrical current, not of excessive wire rope tension or of slippage through the clamps. Mr. Nielsen's report acknowledges that fact when it includes the following statement that references the OSHA report issued more than two years prior to his report.

> *The OSHA report, issued 6 September 2019, concluded that the wire rope used to secure the davit arm in the raised position failed as a result of an electrical current passing through it where it made contact with the davit arm around a sharp corner without relief or protection.*

[78] Notice that he acknowledges that the cause was electrical. Note, too, that OSHA report's reference to *"a sharp corner"* is to identify the location of the failure (*"… where …"*), not the cause, that placed the wire rope in contact with a structural element. Andthe OSHA clause that it was *"without relief or protection"* explains why the electrical current was able to pass

between the wire rope and structure at that location.[17] Simply put, the cause was *"an electrical current passing through it [the wire rope]".* **[18]**

[79] Thus, contrary to Mr. Nielsen's Opinions 1 and 2, the rigging practice utilized by the shipyard to keep the davit arm in the raised position did NOT create *"the hazardous condition that caused the injury and death of Mr. Villalobos-Hernandez on 3 April 2019."* Rather, it was an electrical problem, not a mechanical problem, that caused the failure. But that is not reflected or considered in Mr. Nielsen's report.

[80] Moreover, any experienced on-site inspector from CGS or any other qualified organization would perceive that the wire rope arrangement appeared to be adequate; and this remained to be correct in the absence of any unexpected and/or unforeseeable external event, such as the occurrence of an (invisible) stray electrical current, that would compromise the adequacy of the wire rope arrangement.

[81] It could be suggested that the wire rope arrangement was not adequate only if one should reasonably expect a large number of extremely, remotely possible external events to occur. These might include lightning strike, toppling of a shipyard crane onto the ship, errant electrical current, or falling space debris, among other possibilities.

[82] The errant electrical current is a very remote possibility because the shipyard, where welding occurs every day in numerous locations, has decades of experience in implementing grounding precautions to prevent such events in the presence of the use of welding machines and other electrical equipment at temporary locations on the ships that are undergoing repair. That is why it was altogether reasonable that CGS personnel at the shipyard believed the use of wire rope appeared to be adequate for the task. There was no reasonable basis to consider the possibility of such a remotely possible event as ungrounded electrical current affecting the wire rope. In short, this mechanism of failure of davit arm rigging had never been seen before at the shipyard.

[83] Accordingly, Mr. Nielsen's analyses and concluding opinions regarding the alleged insufficiency of the means and methods of securing the davit arms in their raised position is inappropriate. All analyses of the failure show beyond any doubt that it was the presence of that

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[17] It should be noted that there is no OSHA requirement for rigging restraints to be dielectric, or electrically insulated.

[18] Note that the OSHA report does not attribute the failure, in whole or in part, to shearing by the sharp corner, but only that the sharp corner was the location of the arcing because it presented the small cross sectional area of contact when an errant electrical current developed.

stray electrical current, and not the wire rope and the method of its use, that created *"the hazardous condition that caused the injury …"*

[84] **VIII.3 Nielsen's Opinion of CGS's Specifications:**

Mr. Nielsen's Opinion #1 states that *"Crowley's contract specifications did not adequately detail proper methods for securing lifeboat davit arms."* This is incorrect for two reasons. First, the specifications were never supposed to advise the shipyard of the *"proper methods"* to be used, as shown below. Second, the shipyard's chosen method used for securing the lifeboat davit arms was, in fact, structurally and mechanically adequate for the task of preventing the movement of the davit arm when not subjected to unforeseeable, accidental events, as demonstrated in Section V of this report, Causal Analysis.

[85] That is, Mr. Nielsen is ignoring: (a) the contractual incorporation of the GTR into the ship repair specification; (b) the GTR's direction that *"the shipyard determines how to do the work"*; (c) that the shipyard is responsible for all rigging and unrigging; (d) the shipyard had the opportunity to ask questions and seek clarification in its letter of August 1, 2018 and asked no questions about the davit repairs, and (e) that a Palfinger OEM representative was present to and did not object to the means and method of restraint These aspects of the contract have been detailed above in **Section VI**.

[86] Mr. Nielsen also states,

> *This work to restrain the davit arms was not specified by Crowley's contract and should have been explicitly detailed to include 1) removing davit arms or 2) restrain davit arms using nylon slings or the welding of a physical stop.* [p.14]
>
> *Review of the contract in place between CGS and DSI for repairs on the USNS Lummus shows that there is no detail regarding how to secure the lifeboat davit arms properly and safely for necessary inspection and repair.* [p.17]
>
> *It is the author's opinion that the absence of a contract specification for the safe restraint of the lifeboat davit arms was a direct cause of Mr. Villalobos-Hernandez's injury and death.* [p.18]

[87] That opinion relies on Mr. Nielsen's assessment that the use of the single wire rope and the clamping of three sections of wire rope as a *"safe restraint"* was not in compliance with applicable regulations or with good shipyard practices. He indicates that CGS *"should have been explicitly detailed"* in its specification, requiring an alternative means by which the davit was to be temporarily restrained in its raised position.

[88] The intention of the contract specifications and CGS' responsibilities is spelled out in MSC's General Technical Requirements (COMSC Instruction 4700.16).

> *A work item is used to convey to the Contractor a clear understanding of the work necessary to achieve a desired result. This will allow the Contractor to accurately bid, plan and execute the work in an efficient and effective manner.* [Vessel Defendants 1162, 3.1]
>
> *Work items are performance oriented;* ***the shipyard determines how to do the work.*** *Enough guidance is provided by MSC to bring forth any critical information that the shipyard needs to know. The shipyard is responsible for shipchecking all aspects of the work item. The burden is on the shipyard to provide a fully designed, approved and functional system.* [Vessel Defendants 1164, 3.6] (Emphasis added).
>
> *Do not tell the shipyard to make "temporary access" or how to remove something. The work item author's responsibility is to ensure that it can be done. The shipyard is responsible for providing a finished product.* [Vessel Defendants 1165, 3.10]

[89] The key phrase above is *"Work items are performance oriented; the shipyard determines how to do the work."* That is, the intent of the specification is to let the shipyard determine *"how to do the work"* to achieve the end result that is described by the specification.

[90] Mr. Nielsen's opinion of the inadequacy of the securing method overlooks the contractual determination of which party is responsible for the casualty since the shipyard was responsible for determining how to do the work. Further, in the shipyard's decades of experience, these particular means and methods of such securing were proven mechanically adequate. This is true regardless of whether the method complied with Mr. Nielsen's interpretation of applicable regulations and good shipyard practices. Debating whether that method was consistent with OSHA and/or other applicable standards is not productive to this analysis of responsibility for the casualty because the failure was not due to excessive wire rope tension or of slippage through the clamps or due to shearing of the wire rope on the sharp edge of structure; none of those actions occurred. In this regard, OSHA correctly did not cite the shipyard for such failings because there were no such failures.

[91] Further, Mr. Nielsen's opinion is also incorrect since it is based on the false perception that the CGS specifications *"should have"* addressed the means and methods that were to be used by the shipyard to provide a temporary restraint. This might be correct if there existed a latent or hidden danger regarding the force of gravity on the raised davit arms that was known to the vessel owner or operator but not to the shipyard. However, all the hazards arising from the need to temporarily restrain the raised davits, like the force of gravity itself, were open and obvious, fully appreciated by the shipyard, as shown below in the Section IX on Lack of Latent or Hidden Danger.

[92] A review of all the documents provided to Fisher Maritime (see appendix for listing) found no cautions, warnings, concerns, requests for amendment to the defined davit Work, or other forms of communication from DSI to CGS that the specified davit Work created a hazardous condition that was outside of the shipyard's normal practices or beyond the comprehensive of shipyard management. That is, it was within the shipyard's normal practices to determine by itself when and how to temporarily secure the davit arms in a raised position while the permanent davit falls were being replaced. This is further verified by the shipyard's project manager as shown in the discussion in Section IX, below, regarding the lack of a latent or hidden danger.

[93] Mr. Nielsen states, "*It is the author's opinion that CGS's responsibility to provide a safe workplace remains when their vessel is in a shipyard and manned by CGS crew based on OSHA Standard 1915.3.*" [p.24] In contrast, the cited OSHA Standard states in part:

> *1915.3(b)* ***This part does not apply to owners, operators, agents or masters of vessels unless such persons are acting as "employers."*** *However, this part is not intended to relieve owners, operators, agents or masters of vessels who are not "employers" from responsibilities or duties now placed upon them by law, regulation or custom.* (Emphasis added).

[94] That is, because CGS was not acting as Mr. Hernandez's employer, those OSHA standards do not apply to CGS unless applicable *"law, regulation or custom"* is shown to place such responsibility on CGS. However, Mr. Nielsen does not cite to any *"law, regulation or custom"* which places such duty on CGS pertinent to this casualty. Further, as seen below in Section IX, Lack Of Latent or Hidden Danger, the shipyard clearly acknowledges that the selected method of davit arm restraint was, in fact, consistent with industry custom. The davit manufacturer's Instruction Manual, coupled with the Palfinger representative's acceptance of the lack of use of a stopper bar or similar temporary structure, is further evidence that the use of a restraining cable is consistent with industry custom.

[95] Clearly, OSHA standard 1915.3 applies to DSI with regard to its employees or it's temporary service employees being supervised by DSI supervisors, but not to CGS. That is, this assertion by Mr. Nielsen of CGS's duty per an OSHA regulation to specify the means of providing access to the davit arm is unfounded as no *"law, regulation or custom"* places such duty or responsibility upon CGS with respect to the davit Work.

[96] **VIII.4 Nielsen's Opinion of CGS's Supervision of the Work Site:**

Mr. Nielsen's third opinion and further explanation of the duty of CGS to supervise the shipyard's worksite is the following:

> *Opinion 3: Oversight and inspection of work areas on the USNS 1st LT Jack Lummus by Crowley Government Services Inc., Detyens Shipyards, Inc., and*

> *HiTrack Staffing, Inc., leading up to 3 April 2019 were inadequate and not in compliance with contractual requirements or industry standards.*
>
> *CGS, as contracted operator of the USNS Lummus, should have their own Safety Management System (SMS) in place …* [that] *"Provides for safe practices in ship operation and a safe working environment, … Includes instructions and procedures to ensure safe operation … . The above SMS requirements … requires that CGS personnel regularly inspect worksites on the USNS Lummus, including the lifeboat davit repairs, to identify hazards and to ensure that work is being conducted properly and safely. In the author's opinion, CGS failed to conduct a reasonable inspection and that failure was a direct cause of Mr. Villalobos-Hernandez's injury and death."* [pp. 25-26.]

[97] It is noted that Mr. Nielsen cites to no contractual requirement purportedly ignored or insufficiently observed by CGS. Thus, his allegation that there was a breach of CGS's *"contractual requirements"* cannot be verified or relied upon. Inasmuch as the shipyard was responsible for all rigging, and deciding how to do the work, and because the repair specification provided a Palfinger representative to be present during all renewals and repairs of the davits, it is clear that Mr. Nielsen's opinion of non-compliance with industry standards lacks foundation (see Section VII, above).

[98] Mr. Nielsen clearly alleges that, as the representative of the government (owner of the vessel), CGS had to duty to adhere to the Safety Management System of the vessel operator. He is specific in his criticism of CGS's failure to "*regularly inspect worksites on the USNS Lummus … to identify hazards and to ensure that work is being conducted properly and safely"* as required by the SMS. This allegation requires one to examine the vessel owner's Safety Management System, per the next few paragraphs.

[99] **VIII.5 Non-Role of Vessel's Safety Management System:**

As noted in the prior excerpt from his report, Mr. Nielsen states that *"CGS, as contracted operator of the USNS Lummus, should have their own Safety Management System (SMS) in place …"* It is noted, however, that the contract between Military Sealift Command and Crowley Government Services requires that CGS *"develop and maintain a certified safety management system which fulfills the requirements of the International Maritime Organization's (IMO) International Safety Management Code (ISM)."* [19]

[100] MSC already had a Safety Management System ("SMS") that it uses for ships that it operates without an outside contractor (such as CGS). Thus, to be acceptable to MSC, the Safety

[19] Section 3.18 on page 534 of Contract No. N6238715C3135P00252, 25 July 2014.

Management System that CGS presents essentially mimics that of MSC's, except with regard to certain shoreside administrative matters. That is, the *Lummus'* Safety Management System is already CGS's SMS. In other words, CGS has already developed and implemented an SMS aboard the *USNS Lummus* that mimics the requirements of the SMS used on ships operated by MSC since they have the same objectives and the same criteria for acceptance.

[101] Per the above excerpts from his report, Mr. Nielsen criticizes CGS for non-compliance with the Safety Management System ("SMS") of Military Sealift Command ("MSC"), the owner of the vessel. This criticism is inconsistent with the stated purpose of MSC's SMS, as summarized by the following points. [20]

> • *MSC's Safety Management System provides procedures, checklists and forms for the safe operation and management of ships and for pollution prevention.*
>
> • *This system demonstrates compliance with the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (commonly referred to as the International Safety Management Code or ISM Code).*
>
> • *The system is intended to assist the Master, ship's force, and shoreside staffs in carrying out assignments safely and in compliance with environmental protection regulations.* [underline emphasis added.]

[102] It is noted that this SMS applies to the ship, not the shipyard. To give this specific context, consider the example of the SMS requirements for the Lockout/Tagout of electrical equipment.[21]

> *2.4 Contractors: Lockout / Tag out of ship equipment and systems under the control of MSC, for work to be accomplished by Contractors, is the responsibility of MSC. The Lockout / Tag out ["LOTO"] Record Sheet includes provisions for sign-off by the Contractor's Repair Representative if applicable. MSC's SMS Lockout / Tag out procedures.* [underline emphasis added.]
>
> *NOTE: It is a joint responsibility of the MSC Representative and the Contractor's Repair Representative or others, when applicable, to review LOTO prior to performing work on ship equipment and systems.* [underline emphasis added.]

[103] The MSC SMS clearly addresses safety associated with only the "*ship equipment and systems under the control of MSC.*" The non-grounded welding machine, or possibly some other electrical equipment, that created the errant electrical current -- the root cause of the casualty -- was Contractor equipment, not MSC's or ship equipment. Accordingly, Mr. Nielsen's assessment

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[20] Source: document "MSC350_NEOHandbook_20200213_INTRO.pdf" available at https://d38fsb1zpaztrx.cloudfront.net/files/Safety%20Management%20Brief.pdf

[21] MSC Safety Management System Procedure 2.1-004-ALL, Lock-outTag-out.doc for Contract Opportunity Solicitation-N68171-20-R-0005.

that "*The above SMS requirements … requires that CGS personnel regularly inspect worksites on the USNS Lummus, including the lifeboat davit repairs, to identify hazards"* is inconsistent with the fundamental purpose of the vessel owner's Safety Management System. That is, only *"when applicable"*, worksites that had to be inspected by CGS personnel, per the vessel's SMS, were those involving the work on ship's machinery, not shipyard equipment (e.g. DSI welding machines).

[104] The SMS does not require the owner's representative to maintain oversight of the Contractor's equipment. The shipyard's own safety management system, coupled with compliance with OSHA and other applicable regulations, is the required basis of safety associated with Contractor equipment.

[105] Moreover, the vessel owner pays for, and is contractually allowed to rely on, the shipyard's representation that it will undertake all rigging and unrigging [SER 3.3], that it will *"comply with all applicable safety, health and environmental regulations pertaining to ship repair during the entire performance period"* [Ser 05], and that it will *"inspect all work areas and use its best efforts to prevent accidents, injury or damage … in and about the Work covered by the Specifications* "[SER 08].

[106] As noted above in Section VIII.2, Mr. Nielsen acknowledged the OSHA finding that the wire rope *"failed as a result of an electrical current passing through it."* Further, the determination that the wire rope parted due to electrical activity on the exterior of the vessel indicates that the source of the electrical current was shipyard equipment, thus, again, placing the safety burden on DSI and not on CGS and the ship's Safety Management System.

[107] Further, regarding the lack of applicability of the ship's SMS, consider the actual wording of the International Maritime Organization's (IMO) International Safety Management Code (ISM). Relevant excerpts of the Code include: [22]

> *1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular, to the marine environment, and to property.*
>
> *1.2.2 Safety management objectives of the Company should, inter alia: provide for safe practices in ship operation and a safe working environment.*
>
> *1.4 Functional requirements for a Safety Management System (SMS) -- Every Company should develop, implement and maintain a Safety Management System (SMS) which includes the following functional requirements: instructions and procedures to ensure safe operation of ships and protection of*

[22] ISM-Code International Safety Management Code (Resolution A.741(18)) amended 1/1/2015 MSC/Res.353(92)

> *the environment in compliance with relevant international and flag State legislation.*
>
> *7. Shipboard Operations -- The Company should establish procedures for the preparation of plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the ship and the prevention of pollution.*

[108] It is noteworthy that these excerpts from the IMO's ISM Code for Safety Management refer to safe operation of the vessel, safety at sea, protection of the environment, avoidance of pollution, shipboard operations and compliance with flag State legislation. Thus, the ship's SMS is applicable only when the vessel is operating, under command of its Master, capable of damaging the environment if not operated appropriately, or causing personal injury by its *operations*, none of which contemplates a repair availability in drydock.

[109] This was further explained by the CGS representative's (Paul Varghese) deposition testimony.

> *Q. Is it true and accurate to say that Crowley would have an internal safety management system that applied to the Lummus?*
>
> *A. Yes, safety management system when the vessel is operational. That means when the vessel is certified operating under the command of the master of the vessel safety management system is in operation. But when the vessel is in RAV the safety management system is not applicable -- Like the one in Detyens. … When the Lummus was in Detyens Shipyard she did not have the valid certification. So the safety management system was not valid.*
>
> [Varghese dep'n p.22/1-23.]

[110] That is, the SMS is not applicable when the ship is not operating. A vessel is not in *"operation"* when substantially inoperable in a shipyard. Thus, Mr. Nielsen's statement that *"the above SMS requirements … requires that CGS personnel regularly inspect worksites on the USNS Lummus, including the lifeboat davit repairs, to identify hazards and to ensure that work is being conducted properly and safely"* is contrary to the purpose and intent of a ship's Safety Management System, namely, *"to ensure safe operation of ships and protection of the environment."* In short, the CGS SMS is neither applicable nor a basis for responsibility.

[111] Mr. Nielsen's report interprets the ship's Safety Management System to require that CGS, as operator of the vessel, has to conduct inspections of the shipyard's ongoing work aboard the ship. If this is correct, consider the extent of personnel requirements that this would create. CGS representatives would regularly and frequently have to be at every worksite aboard the ship, perhaps dozens at a time for months on end, in order to *"ensure that work is being conducted properly and safely."* Moreover, the few CGS personnel and ship's crew present at the shipyard during this project are not safety experts. This means that CGS would have had to bring in a team

of safety experts who would be looking over the same work sites that would be concurrently monitored by the DSI safety team, paid for by CGS.

[112] Thus, Mr. Nielsen's report would have CGS completely duplicate the resources of the DSI Safety Management System. However, Mr. Nielsen later acknowledged that the ship's SMS was not expected to be functional while the ship is in the shipyard.

> *Q. But you have no reason to dispute that the Crowley SMS was dormant and the shipyard was prevailing while the vessel was in dry dock.*
> *A. "I'm sure that based on that statement, that that's what the bridging document would reflect, so no, I have no reason to dispute that."*
> [G.Nielsen dep'n 202/21.]

VIII.6 Deposition of Gerald Nielsen

After issuing his report, Plaintiff's expert Gerald Nielsen gave his deposition. Much of his testimony supports the conclusions set forth above. Two aspects of his deposition merit particular attention.

(A) Stored Energy

> *"The hazard was the stored energy, the davit being secured in an area where gravity could work on it if you lost your retention, so the hazard was the stored energy. The risk was that something could happen to release that stored energy. That risk manifested itself in the way of a stray current."*
> [G. Nielsen dep'n 185/8.]

[113] This is the basis of Mr. Nielsen's explanation for the necessity of having a second means of restraining or limiting the ability of the davit arm to move down the inclined channels of the davit frame, namely, that there might be an unexpected release of stored energy. Using this logic, everything else on the ship or in the shipyard that represents stored energy should have two means of limiting the inadvertent release of that stored energy, regardless of how well proven in practice, the means of avoiding such a release of stored energy might be.

[114] Everything that is positioned above the ground contains stored energy that could be released by some untoward and unforeseeable event. When subjected to severe storm conditions, the rail-based shipyard crane itself (not the load it lifts) could topple, leading to personal injuries. But properly engineered foundations, rails, and component design have rendered those concerns reasonably moot. Flagpoles could topple onto passers-by. Extra wire stays in multiple directions could provide a secondary means to prevent the toppling if storm conditions would otherwise topple the flagpole. But properly designed foundations and the design

of the flagpole base's structure have proven adequate against storms in tens of thousands of locations without such wire stays.

[115] For this project, the davit arms were successfully restrained by a single cable with clamps across three passes of the wire rope for five months. The parties who were aware of this arrangement during that time include at least the following: DSI, U.S. Coast Guard, ABS, Palfinger, Hightrak, and CGS. No employee or representative of those organizations ever expressed concern about the hazard of "stored energy" in the twelve restrained davit arms. It appears that they recognized the reliability of the method of restraint because: (i) it was successfully used for five months on 12 davit arms on the *Lummus;* (ii) the shipyard had used the same procedure for over 20 years on dozens of prior projects; and (iii) the method had been developed and implemented by the shipyard's very experienced, highly skilled, very qualified rigging department.

[116] That is, many professionals in the highest levels of the marine industry for years, on behalf of a variety of organizations, were confident that the inadvertent release of stored energy of the davit arms was sufficiently unlikely because proven procedures were being used, consistent with industry practice, in a working environment that had a proven record of safety – for decades.

(B) Failed Safety Procedures

> Q. The actual cable itself did not fail due to excessive weight. Do you agree with that?
> A. *"I agree."*
> Q. Do you agree that the rigging of the cable using the clips itself did not result in the failure in this case?
> A. *"Specific to the clips, correct. I agree."*
> Q. Do you accept or not accept the explanation that the wire rope failed due to electrical arcing?
> A. *"I agree with that."* [G. Nielsen dep'n 69/20.]

[117] Mr. Nielsen acknowledges that the mechanical and structural integrity of the restraints were sufficient. Further, Mr. Nielsen acknowledges that the underlying event was the result of the highly improbable oversight of normal shipyard safety procedures, in this case, the proper grounding of a welding machine (or equivalent) was overlooked. Thus, Mr. Nielsen is basically advocating that, in order to ensure a safe workplace for all who may come aboard the ship, the parties involved have to anticipate that non-obvious normal safety procedures are likely to be ignored. He is in essence saying, "Don't believe or expect that routine safety measures are followed." In his view, CGS should pay for DSI's safety department and contractual obligations and also duplicate them.

[118] Thus, per Mr. Nielsen's perspective, measures should be taken to avoid personal injuries that could arise from any such ignored safety procedure. In that case, all those persons would have to be protected at all times from an electrical shock coming from any element of steel structure because there may be ungrounded electrical equipment or failed insulation on wires electrifying the structure. All those persons would have to stay away from joints of pressurized pipes because the routine testing and inspections may not have been performed. All those persons would have to be advised to expect that flash fires caused by hot work on the ship could quickly spread because the portable fire extinguishers used by fire watch personnel may not have been recharged after previous use. Other scenarios predicated on lack of use of non-obvious safety procedures could be postulated, but these three examples illustrate the illogical nature of such a perspective: "Don't believe or expect that routine safety measures, for which you have paid by contract, are followed."

[119] If an organization begins to require safety redundancies in an industrial setting to guard against all manner of highly improbable events, no matter how remote, consideration would have to be given to every type of event that could result from failure to follow the already-identified safety measures that industries have found to be appropriate and are routinely implemented. It is difficult to imagine how many additional mechanisms and personnel would have to be deployed to guard against the consequences of failing to implement safety features against every conceivable hazard, no matter how remote, appropriate to each task.

IX LACK OF LATENT OR HIDDEN DANGER

[120] In this report's prior discussion of Mr. Nielsen's report, it was noted that there might be concern about the completeness of the repair specification if there existed a latent or hidden danger regarding the force of gravity on the davit arms that was known to the vessel operator but not to the shipyard. The relevant issue is the selection of the method that the shipyard would use to create access to the davit arms, for accomplishment of the specified work, once the lifeboat falls had been removed for later replacement. In order to address that issue, the deposition of DSI's project manager, Mr. Dallas Verble, is considered. [Notations refer to his deposition of February 9, 2022 by page/line.]

[121] Speaking for DSI, Mr. Verble stated that, as project manager, he does *not* rely on the contract documents to determine the safety mechanisms that need to be put in place for the job. Rather, he relies exclusively on *"Safety manuals, OSHA manuals, Detyens policies we have for safety, procedures we have in place is what we rely on."* [25/11]

[122] If the contract specifications *"say do one, two, three, four and five in order, I'm going to make sure my people are doing in that order because that's what the customer wants to do."* [31/2] *"We have to follow the specifications the way they've written it until we can't and then we provide them a change order, say we can't do this."* [32/14] "*We have to follow the specifications*

as close as we can." However, *"If there's -- any time there's an issue and we can't follow specifications, we stop, we tell the customer …"* [32/23]

[123] *"How did I find out that Detyens folks [did the rigging to restrain the davit]? Because we've always restrained the davit arms".* [46/2] *"There's no direction [in the Specifications] on how to rig."*[46/20] *"The davit arms are put up and secured up in place because the [permanent] wires have to be taken off and replaced. Those wires* [the permanent, now removed falls] *are what restrains the thing up there … [in their] normal operating method."*[47/25]

[124] *"Yes"*, [I am depending on the guys at the rigging shop to use their knowledge and experience on how to get the restraints done]. [65/11] Detyens had *"no written policy"* for how to properly and safely restrain davit arms. [70/4] *"It was standard marine practices that we've been doing -- it's the way we've been restraining the davits for years."*[70/7]

[125] *"The davit is lifted up by the crane and put in upper position and the cable is put on to hold it in place. … It has clamps on it to hold it."*[70/17] The OEM representative from Palfinger *"doesn't get involved to do [the restraint rigging] it because the riggers have the experience and the skill and they've always done it."*[72/16]

[126] *"Our best effort was we wired it up with steel cable like we've always done. That's the way we've done it. We never had an issue in the past."*[75/8] *"There was no question before this happened that the wire rope was an issue. So it was an accident that happened, all of a sudden this wire rope let go. It's never happened before. We didn't know there was an issue then."*[81/16]. Neither could CGS have known.

[127] These understandings and perspectives of the project manager, Mr. Verble, are the same as those of the shipyard's safety officer, Mr. James Lyles. In his deposition of December 14, 2021, Mr. Lyles stated that the possible inadvertent release of the lifeboat davit arm to move down the davit frame was never discussed during any *Lummus* meetings. *"It had never been an issue before."* No safety protocols/procedures addressed that requirement since *"it had never been an issue before, so … it wouldn't have been addressed. I mean, there would be no reason to address it."*[62/16-63/6]. Accordingly, CGS attendance of safety meetings run by DSI would not have changed the outcome, as the issue of a stray electrical current compromising a standard rigging method was unknown.

[128] As determined in this report 's Section V on Causal Analysis, the parting of the wire rope was the result of the shipyard allowing an errant and damaging and invisible electrical current to flow between the restraining wire rope and the davit arm's structure. There was nothing mechanically insufficient in the choice of using a restraining wire rope, nor about strength with which it was rigged, nor about the use of clamps to secure it into the appropriate loops. The wire rope did not part due to a mechanical, material, tensile or other structural deficiency that

had been overlooked by the shipyard; it parted solely due to the presence of an uncontrolled and invisible electrical current.

[129] The shipyard's selected method of making the davit arms accessible for work after the lifeboat falls were removed did not create the risk of failure that was experienced. To suggest otherwise is akin to precluding the use of a crane to hoist equipment onto a ship because it is inherently risky. Such risk is abated by using a suitable lifting wire rope. Similarly, whatever risk existed in the shipyard's method of creating access to the davit arm was not affected by latent or hidden dangers -- the force of gravity was open and obvious and adequately addressed by the strength of the wire rope. The occurrence of an invisible electrical current was not, and it would have been unknown to CGS.

[130] The above excerpts from Mr. Verble's and Mr. Lyles' depositions establish that the mechanism used by the shipyard was a *"normal operating method"* and *"standard marine practice"* that had been used *"for years."* Further, after the accident, Mr. William Marshall, DSI's Environmental Safety Manager, noted that the specifications did not include the means to store the lifeboat davit arm. He discussed that alleged deficiency with Mr. Larry Reynolds, the shipyard's operations vice president, who did not think the lack of written instruction in the specification was relevant. [Marshall dep'n 35/3-24.] When questioned on this point, Mr. Marshall admitted that he did not examine any other ship repair specifications to determine whether the method of davit restraint was included in those specifications.[23] As such, Mr. Marshall had no basis for comparison or foundation for this early opinion. DSI Project Manager Dallas Verble testified that there was nothing deficient about the CGS repair specification.[24]

[131] Clearly, from the shipyard's perspective, the successful use of its selected method to restrain the raised davit arm was sufficient both previously as well as when used on the *Lummus.* That is, there were no latent or hidden dangers, known to ship owner but not to the repair contractor, associated with the need to provide access to the davit arms for the specified repairs.

[132] The CGS specifications define the Work to be accomplished on the davits, with additional work to be based on the Palfinger inspection reports that were to be produced in accordance with the contract. (The specifications for the emergent, additional work were authored by DSI, based on the Palfinger reports.) That is, in accordance with the MSC General

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[23] **Q**. Have you spoken with anybody at Detyens who had some familiarity with repairing davit arms on either this ship or other ships? **A**. *"No sir."* [Wm. Marshall dep'n 61/2.]

Q. Have you compared it [repair specification 601] to other specs where other specs did provide that information? **A**. *"I did not compare them."* [Wm. Marshall dep'n 92/22.]

[24] **Q**. Did you find the specification [repair specification 601] to be deficient because it did not contain a specific instruction on how to restrain the davit arms? **A**. *"I did not."* [D. Verble dep'n 128/17.]

Technical Requirements incorporated into the shipyard repair specification, the CGS specifications defined what was to be achieved; not how it was to be achieved.

[133] Per the cited testimony of Mr. Verble and Mr. Marshall, there was no latent or hidden danger associated with the temporary restraining of the davit arms. The force of gravity was open and obvious. In the absence of latent or hidden dangers associated with the need to create access to portions of the davits after the lifeboat falls had been removed, CGS did not have a responsibility to add to the specifications the method to be used to create that accessibility. Thus, any suggestion that the Specifications provided by CGS were insufficient because they did not disclose a latent or hidden danger with respect to the Work to be accomplished on the davits in the presence of gravity is without foundation.

X SUMMARIZATION

[134] The purpose of this analysis has been to assess the factors that contributed to the uncontrolled lowering of the davit arm, with focus on identifying the role of the major parties involved in the ship repair project. The assessment may be useful in identifying the party responsible for the sudden failure of the restraining wire rope, which failure led to the injury.

[135] Based on the above reviews of relevant facts, reviews of referenced documents including those listed in the Appendix, the identified factual observations (both contemporaneous and post-accident), the cited testimony of witnesses, and the analyses presented herein, the following summarizes those reviews and analyses.

(a) The August 2018 contract between Crowley Government Services, Inc. and Detyens Shipyard, Inc. for repairs and maintenance work on the *USNS 1st LT JACK LUMMUS* incorporated requirements for the shipyard to perform repair and maintenance work on the 6 sets of lifeboat davits, among other work tasks, including performing all rigging and unrigging of structures and equipment.

(b) DSI contractually accepted the responsibility to provide all rigging and unrigging necessary to accomplish the workscope of the contract.

(c) The lifeboat davit tasks, generally identified under the contract's Specification Item 601 (Lifeboat Davit Repairs and Falls Renewal), required the removal of the lifeboats to cradles on land, followed by the later replacement of the lifeboat falls (wire ropes) that are used to raise and lower the lifeboats.

(d) The Specifications also required that the davit frames and davit arms be subjected to inspection once the falls were removed, thereby necessitating a means of providing access to all parts of the davits for the Palfinger representative as well as for the workers

who later would be performing the repairs. The repairs included restraint of the davit arms and the use of welding.

(e) The davit arms can be raised and lowered on the fixed frame of the davit by use of the lifeboat falls. The shipyard determined that it would make the lifeboat davit arms and davit structures accessible for repairs, following removal of the lifeboat falls, by restraining them in the raised position using a mechanism other than the lifeboat falls.

(f) For each davit, the shipyard chose, as it has for decades, to use a wire rope to restrain each davit arm in the raised position, with one part of the wire rope looped around part of the fixed frame of the davit, and the other part of the wire rope looped around a part of the moveable davit arm. The loops were joined by two clamps each securing three passes of the wire rope. No clamps slipped or failed.

(g) The Instruction Manual of the manufacturer of the davits specifically requires the use of a cable or chain to restrain the davit arm when, as here, the falls are removed, and not to use the stopper bar or similar structural element. This serves to endorse the shipyard's method of restraining the davit arm when the falls had been disconnected and removed. Further, the Palfinger representative who was present and oversaw the davit repairs did not request the addition of a temporary stopper bar or similar structural element, although the absence of it was patently obvious when he was preparing the recommendations for repairs to the davits and supervising the repairs.

(h) The shipyard has acknowledged that it has successfully utilized the same method of restraining the davit arms on multiple prior ship repair assignments for at least two decades. Thus, the necessity of creating worker accessibility to the davit arm for repairs and maintenance did not introduce any latent or hidden dangers, known to the ship owner but not known to the shipyard. Any danger presented by gravity was open and obvious. Dangers presented by ungrounded electrical currents, in contrast, would have been unknown to CGS. Accordingly, the acting ship owner (CGS) did not have an obligation to use the Specifications to warn the shipyard of any latent or hidden danger that might be encountered in the accomplishment of the specified davit Work.

(i) Per the ISM International Safety Management Code, the vessel's Safety Management System is applicable only when the vessel is in an operational mode with the vessel's Master being in command of the vessel. Accordingly, while the ship was inoperable in the shipyard, the acting ship owner's representative did not have an obligation or any reasonable expectation that it would duplicate the shipyard's safety inspection protocols.

(j) Persons who were tasked with repairing the davits included employees of one or more shipyard subcontractors, supervised by the shipyard's personnel, which persons are determined by OSHA to have been temporary service employees of the shipyard.

(k) On the morning of April 3, 2020, Mr. Juan Antonio Villalobos Hernandez, a temporary service employee, was engaged on davit repairs while on the top of a winch housing above the main deck of the *Lummus.* He was located below the after arm of the starboard aft davit when that previously raised and secured davit arm rolled down the fixed frame of the davit and struck him.

(l) The davit arm rolled down the fixed davit frame due to the temporary restraining wire rope having melted in the portion that had been looped around a part of the moveable davit arm.

(m) Examination of the parted/melted ends of the wire rope eliminated as possible causes of the failure each of: corrosion; shearing by structures or implements; cutting by flame; excess physical tension; and direct contact with an electrically charged welding rod.

(n) Nearly all the approximately 130 individual wires within the wire rope had separated due to melting individually, leading to a near-total loss of strength of the wire rope. The few remaining wires were immediately overloaded, stretched, and failed in tension.

(o) The melting of those components of the wire rope was due to one or more instances uncontrolled transmission of (invisible) electrical current.

(p) The only feasible cause of the parting of the subject wire rope was improper and/or insufficient electrical grounding connections and insulations, allowing an electrical arc to form or electrical current to flow between the restraining wire rope and the davit arm's structure.

(q) The wire rope did not part due to material, mechanical, or tensile deficiency, but only because it was adversely affected by an uncontrolled flow of electrical current. Accordingly, the shipyard's use of the wire rope looped around structural elements to secure the davit in the raised position, and the use of clamps (wire rope clips) were, in fact, structurally and mechanically adequate for the task in the absence of such uncontrolled electric current.

(r) The exact location of the origin of that uncontrolled electric current has not been identified in the examined documents and photographs. However, as the electrical current occurred outside on deck in way of various shipyard works including welding machines and other electrical equipment, it appears that the current emanated from shipyard equipment on deck as confirmed by the OSHA inspector's report [25] that includes the certification of corrective action having been taken by the shipyard.

(s) Inasmuch as the source of the uncontrolled electricity was shipyard equipment, the acting ship owner (CGS) did not have an obligation under either OSHA regulations or

[25] Inspection Report 1391322 within OSHA FOIA Response - 2021-F-11775.pdf

under the ship's Safety Management System to have ensured that no such uncontrolled electricity would occur or be present at the worksite.

XI OBSERVATIONS

[136] The following observations are based on the author's naval architecture and engineering education and many years of analyses of personal injury casualties in the marine industry, coupled with his expertise in contract and project management of shipyard projects, together with his knowledge of the marine industry as well as work experience.

[137] There appears to be uniform agreement among the several involved parties and agencies that the underlying cause of the accident was an errant electrical current. This current would have been visible to no one. Although the errant current melted and weakened the wire rope, such current could just as easily have caused a fire, electrocution, an explosion, an amputation, or perhaps some other untoward event resulting in personal injury. These possibilities exist, albeit equally remotely, in the environment of ship repair at a shipyard. It was happenstance that the errant electrical current affected the structural integrity of the restraining wire rope, and did not cause one of the other possible hazards to eventuate instead.

(a) **Fire:** But if, instead, an injury-causing fire had developed due to electrical current in an area where there was supposed to be no energized electrical leads, a misleading focus of this matter might be on the presence of flammable materials in the vicinity of the fire-injured person instead of focusing on the source of the errant electrical current.

(b) **Electrocution:** Or if the errant current unexpectedly activated a partially exposed wire that was not supposed to be electrically energized, and thus caused a person to be electrocuted, a misleading focus would be on the presence of an exposed wire that unexpectedly carried significant amperage instead of focusing on the source of the errant electrical current.

(c) **Explosion:** If, instead, an explosion had occurred due to an electrical spark in an area where there was supposed to be no energized electrical leads, a misleading focus might be on the source of explosive vapors being released from their source and accumulating in the vicinity of the injured person instead of focusing on the source of the errant electrical current.

(d) **Amputation:** Alternatively, if the injured person suffered an intense electrical shock/burn on a limb from an exposed wire that was not supposed to be energized, leading to amputation, a focus might be on why the personal protective equipment

did not provide sufficient insulation against electrical shock instead of focusing on the source of the errant electrical current.

[138] That is, the focus should be not on the wire rope restraint that has worked for decades without incident and succesfully restrained 12 davit arms on the USNS *Lummus* for five months and on eleven of the davit arms for longer than that, but on the source and responsibility for the ungrounded electrical current that caused this failure. In this regard, in the working environment of a ship repair yard, there are many potential but highly improbable causes of personal injury for which the shipyard routinely takes measures to eliminate the possibility of such adverse outcomes. In this case, the root cause highly improbable event was an errant electrical current that could have caused injury in any of several possible forms. In this case, it was the melting of an otherwise sound wire rope rigging restraint.

[139] Since it was only happenstance that the current led to a loss of structural integrity of the wire rope, the reaction of some parties has been to focus on the reliability of the restraining wire rope. But that is misleading and diverts attention from the root cause of the accident. In this instance, the shipyard failed to implement one or more of the electrical safety measures that it had committed to implement to eliminate any of those possible hazards. The shipyard's responsibility would be the same regardless if the result of such management failure – allowing the presence of the errant electrical current – led to any of fire, electrocution, explosion, amputation, or loss of structural integrity.

[140] Accordingly, from the perspective of contract and project management, all of the discussions, arguments, and allegations pertaining to the use of the wire rope to restrain the davit arm appear to be inappropriate, especially since, but not because, that method happens to be consistent with the davit manufacturer's Instruction Manual. Mr. Hernandez, DSI employees, subcontractor employees, the Palfinger inspector, CGS personnel, classification personnel, CGS itself, the United States, and other persons and parties present at the shipyard relied on the shipyard's contractual representation that it would implement appropriate safety measures to avoid possible personal injury, regardless of the form of that potential personal injury.

[141] In this case, certain electrical safety measures were not implemented by the shipyard. Per contractual commitments and representations, DSI's contractually-defined accountability to provide a safe working environment for all persons involved in the ship repair project is neither shared with or transferred to other parties merely because those others had been participants in the on-going ship repair project.

XII CONCLUSIONS

[142] The following conclusions are derived from the facts, evidence, documents, testimony, and analyses presented above.

(i) The davit arm rolled down the davit's frame in an uncontrolled manner, injuring Mr. Hernandez, when the temporary wire rope used to restrain the davit arm in a raised position melted and then parted (failed).

(ii) That wire rope melted and parted due to an uncontrolled electrical current causing arcing or short circuit between the wire rope and part of the davit arm structure, resulting in the melting of nearly all of the individual wires within the wire rope. Other possible causes of possible failure have been examined and systematically ruled out.

(iii) The vessel's Safety Management System applies only when the vessel is operational under the control of the ship's Master. Because the ship was not operational nor under the control of the ship's Master while DSI was executing its contractual workscope, CGS had no contractual role in confirming or directing the application of safety devices and procedures to equipment or methods being used by DSI.

(iv) Thus, there was no basis for CGS to suggest, ask, or direct the shipyard to use a different method to make the davit arms accessible for the specified work. It was appropriate for CGS to contractually allow DSI to decide "how to do the work" and to assess that the wire rope restraint appeared to be adequate in the anticipation of reasonable shipyard operations since the method was selected by the shipyard's rigging department, which department has expertise in such matters while CGS and the ship's on-site crew do not.

(v) The intent of CGS' specifications, as set forth in the General Technical Requirements (GTR) incorporated into the repair contract, was to let the shipyard determine *"how to do the work"* to achieve the end result that is described by the specification.

(vi) The potential hazard of the force of gravity in DSI's restraining of the davit arms was open and obvious. The shipyard was contractually obligated to undertake all rigging and unrigging. Because there were no latent or hidden dangers associated with the specified davit workscope or with the force of gravity, CGS' specification was not defective, deficient, or misleading.

(vii) The shipyard's method to restrain the davit arms in their raised position – i.e., the use of the wire rope with two loops and two clamps – was required by the davit manufacturer's Instruction Manual and had been successfully used on multiple other ship repair assignments on ships having the same configuration of lifeboat davits for at least two decades at DSI.

(viii) That is, the rigging method used to secure the davit arm in the raised position was a structurally safe method to oppose the force of gravity. It was consistent with the davit manufacturer's Instruction Manual and consistent with the expertise of the shipyard's rigging department, on which CGS contractually relied. That safe method

would have been adequate and sufficient except for the highly improbable event of the invisible and errant electrical current.

(ix) The only unsafe factor that contributed to the accident was the inappropriate, incomplete, or insufficient electrical connections used for electrically grounding the welding machine, specifically, allowing an employee to be *"working on the davit without a proper grounding circuit exposed the employee to the hazard …"* [OSHA Inspection Report 1391322, 9/13/2019.]

(x) The preparation and connections of the shipyard's welding machines and other electrical equipment for use by shipyard employees (including temporary service employees) was accomplished under the supervision of the shipyard in accordance with its contractual responsibilities.

(xi) Because the electrical current that caused the parting of the temporary restraining wire rope came from shipyard equipment and not from the ship's equipment, CGS did not have a duty to oversee the proper use of that electrical equipment.

(xii) CGS had a valid expectation that there would be no errant electrical currents affecting the project because the shipyard had many years of experience in implementing safety precautions to prevent such events in the presence of the use of the shipyard's welding machines and other electrical equipment at temporary locations on the ships that are undergoing repair

(xiii) Thus CGS' project management actions were not contrary to the requirements of the ship's Safety Management System or OSHA requirements because the SMS applied to the ship's machinery, not to the contractor's equipment, and applies only when the vessel is in operation under the command of the Master.

(xiv) All decisions, actions, supervision, equipment, and directions that contributed to the cause of the accident were solely the responsibility of the shipyard, DSI, which responsibility was clearly assigned to and accepted by DSI under its contract with CGS. If one were to assign any other responsibility for this accident, on the unfounded basis that the method of restraint was somehow inadequate, one should look to the OEM representative present for the repairs, Palfinger.

(xv) CGS, as the acting Vessel Owner, had no role in the decisions and factors that led to the parting of the wire rope.

(xvi) Lastly, CGS delivered and turned over the vessel in a safe condition to DSI. The force of gravity on the davit arms was open and obvious to the shipyard and was not a latent defect known to CGS and unknown to the shipyard. DSI's rigging department works with and opposes the force of gravity every day. By contract, the repairs of the davits were under the active control of DSI and not under the control of CGS.

Exhibit I

(xvii) Finally, because the method of restraint had worked well and without incident for DSI for several decades, and because the davit arms on the USNS *Lummus* had been successfully restrained for five months before an errant electrical current caused one wire rope to melt and part, CGS had no cause to intervene to suggest an alternative method of restraint of the davit arms.

The foregoing opinions have been expressed to a reasonable degree of marine engineering and naval architectural certainty.

Fisher Maritime LLC

Dr. Kenneth W. Fisher

Exhibit I

APPENDIX – DOCUMENTS REVIEWED BY FISHER MARITIME

Documents specific to this matter have been arranged in chronological order.
Applicable filenames are included in italics.

1. Rigging, Type 28-21 Gravity Dave – 30' Open Lifeboat
   Vessel Defendants 1239-1240 (Tech. Dwg. Lifeboat Falls & Gripes).pdf.....25 April 1983
2. Instruction Book, Type 28-21 Gravity Davit. Marine Safety Equipment Corporation, Farmingdale, New Jersey. MASECO Book No. 6167-76..... June 1984
3. MSC General Technical Requirements (COMSC Instruction 4700.16)
   GTR COMSC Instruction 4700.16 (1026-1227).pdf,
   Ex. 14 - Vessel Defendants 1026-1227 (GTR COMSC Instruction).pdf, &
   GTR Excerpt.pdf..... 16 June 1997
4. Solicitation, Offer and Award – Contract № N6238715C3135P00252
   MSC - CGS Contract (Redacted Version).pdf..... 25 July 2014
5. Hitrak Staffing Safety Orientation For Detyens Shipyards
   DSI 004-006 - HiTrak Safety Orientation.pdf..... 28 December 2015
6. Temporary Worker Services Agreement
   DSI 042-047 - Temp Worker Services Agreement.pdf & *LeoAFary_1.pdf*..... 15 June 2016
7. Temporary Worker Services Agreement*DSI 119-124 - Temp Worker Services Agreement.pdf* &
   JonathanGStewart_2.pdf..... 22 September 2016
8. Southern Skill Trades Employment Hire Packet
   DSI 041 - Southern Skill Trades Hire Packet.pdf.....31 October 2016
9. Plaintiff's Exhibit Fary 2 *LeoAFary_2.pdf*..... 24 May 2017
10. Plaintiff's Exhibit Fary 3 *LeoAFary_3.pdf*..... 24 May 2017
11. USNS LUMMUS (T-AK 3011) November 2019 ROH [Repair Specifications]
    Vessel Defendants 955-979 (Repair Spec).pdf
    a. General Requirements Item No. 0001 Definition and General Requirements
       A-LUMMUS-WI 001-DEFINITIONS AND GENERAL REQUIREMENTS-
       N734 Reviewed.pdf & *DSI Riggin (960).pdf*..... 08 March 2018
    b. General Requirements Item No. 0002 Arrival, Departure and Safe Berthing
       A-LUMMUS-WI 002-ARRIVAL, DEPARTURE AND SAFE BERTHING
       N734 Reviewed.pdf..... 08 March 2018
    c. General Requirements Item No. 0003 Housekeeping and Habitability
       A-LUMMUS-WI 003-HOUSEKEEPING AND HABITABILITY N734 Reviewed.pdf..... 08 March 2018
    d. Outfit, Furnishings & Habitability Item No. 601 Lifeboat Davit Repairs
       and Falls Renewal*A-LUMMUS-WI 601 LIFEBOAT DAVIT REPAIRS & FALLS RENEW*
       N734 Rev'd.pdf..... 09 March 2018
    e. USNS LUMMUS Work Item Index *A-LUMMUS-WI 000-SPEC ITEM INDEX.pdf* &
       Lummus 2019 TOC (1014-1018).pdf.....November 2019
12. USNS LUMMUS Bid Proposal DSI #5021
    DSI Bid Clarification & Exceptions (1 Aug 2018)(1019-1024).pdf &
    Ex. 15 - Vessel Defendants 1019-1024 (DSI Bid Clarification & Exceptions).pdf).....01 August 2018
13. USNS LUMMUS ROH 2018 DETYENS AWARD *DSI 007-041 - Repair Contract.pdf*..... 24 August 2018
14. USNS LUMMUS DSI #5021 *DSI 109-114 - Signed Repair Contract.pdf*..... 05 September 2018

Exhibit I

15. Port Engineer (MPF) *CGS Port Engineer Duties (1025).pdf* ..... 18 September 2018
16. Palfinger Quotation FA5409791 to Detyens Shipyard Inc. and other documents
    Palfinger 00001 - 000060 ..... 18 October 2018
17. Test and Inspection Report
    DSI 001 - Test Inspection Report, Six Lifeboats, Davits.pdf ..... 04 January 2019
18. Inspection Report № 165 *DSI 048-148 - Pallinger Lifeboat Davits Report.pdf*,
    DallasAVerble_4.pdf, *DallasAVerble_5.pdf*, & *DallasAVerble_6.pdf* ..... 7 January 2019
19. Plaintiff's Exhibit Verble 7 *DallasAVerble_7.pdf* ..... 10 January 2019
20. Plaintiff's Exhibit Verble 8 *DallasAVerble_8.pdf* ..... 10 January 2019
21. Daily Job Safety (Hazards) Analysis (JSHA)/Daily Work (Job Sheet)
    DSI 002-003 - Job Safety Hazard Analysis.pdf, & *DallasAVerble_11.pdf* ..... 03 April 2019
22. Detyens Shipyards, Inc. Hot Work Permit NAVSEA Standard Item 009-07
    DSI 205, Hotwork Permit (4 Apr 2019).pdf ..... 03 April 2019
23. Plaintiff's Exhibit Verble 9 *DallasAVerble_9.pdf* ..... 03 April 2019
24. Witness Statements
    DSI 274-280 - Witness Statements, DSI.pdf ..... 03 April 2019
25. Detyens Shipyards, Inc. – Accident/Incident Report
    DSI 281-285 - Accident Report, DSI.pdf ..... 09 April 2019
26. Plaintiff's Exhibit Stewart 1 *JonathanGStewart_1.pdf* ..... 25 April 2019
27. Evaluation of wire rope used for securing a davit on a ship during repair
    OSHA Investigative Report (Wire Rope).pdf ..... 10 July 2019
28. Complaint (Non-Jury) *01 - Complaint.pdf* & *Complaint.pdf* ..... 01 April 2021
29. Answer by Defendants United States of America, Crowley Maritime Corporation, and
    Crowley Government Services, Inc. and Cross-Claims against Defendants Detyens
    Shipyards, Inc., and Hightrack Staffing, Inc. D/B/A Hitrak Staffing, Inc.
    12 - Answer and Cross-Claims of Vessel Defendants.pdf ..... 19 May 2021
30. Defendants Detyens Shipyards, Inc. and Hightrak Staffing, Inc. D/B/A Hitrak Staffing,
    Inc.'s Answers to Local Civil Rule 26.03 Disclosures
    22 - Detyens and HighTrak LR 26.03 Interrogatory Responses.pdf ..... 24 June 2021
31. Local Rule 26.03 Answers of Defendants United States of America, Crowley Maritime
    Corporation, And Crowley Government Services, Inc.
    24 - Vessel Defendants' LR 26.03 Interrogatory Responses.pdf ..... 24 June 2021
32. Plaintiff's Rule 26.03 Disclosures
    23 - Plaintiff's LR 26.03 Interrogatory Responses.pdf ..... 24 June 2021
33. Second Amended Scheduling Order
    28 - Second Amended Scheduling Order.pdf ..... 17 September 2021
34. Responses of Defendant Crowley Government Services, Inc. to Plaintiff's First
    Interrogatories *CGS Responses to Plaintiff's First Roggs (28 Sept 21).pdf* ..... 28 September 2021
35. Responses of Defendant Crowley Government Services, Inc. to Plaintiff's First
    Requests for Production *CGS Responses to Plaintiff's First RFPs (28 Sept 21).pdf*. 28 September 2021
36. Responses Of Defendant Crowley Maritime Corporation to Plaintiff's First
    Requests for Production
    Crowley Mar. Resp. to Plaintiff's First RFPs (28 Sept 2021).pdf ..... 28 September 2021

Exhibit I

37. Responses of Defendant United States of America To Plaintiff's First Interrogatories *USA Responses to Plaintiff's First Roggs (28 Sept 2021).pdf* ..... 28 September 2021
38. Responses Of Defendant United States of America To Plaintiff's First Requests For Production *USA Responses to Plaintiff's First RFPs (28 Sept 2021).pdf* ..... 28 September 2021
39. Plaintiff's Answers to Defendants Detyens Shipyards, Inc. And Hightrak Staffing, Inc. D/B/A Hitrak Staffing, Inc.'s First Set of Interrogatories *PLT's Answers to Detyen and HiTrak's 1st ROGS.pdf* .....29 October 2021
40. Plaintiff's Answers to Defendants United States of America, Crowley Maritime Corporation, And Crowley Government Services, Inc.'s First Set Of Interrogatories *PLT's Answers to CGS CMC and USAs 1st ROGS.pdf* .....29 October 2021
41. Plaintiff's Answers to Defendants United States of America, Crowley Maritime Corporation, And Crowley Government Services, Inc.'s First Set Of Requests For Production *PLT's Answers to CGS CMC and USAs 1st RFPs.pdf* .....29 October 2021
42. Defendant Detyens Shipyards, Inc.'s Answers to Plaintiff's First Set of Interrogatories *DSI Ans to PLF ROGS.pdf* ..... 11 November 2021
43. Defendant Detyens Shipyards, Inc.'s Responses To Plaintiff's First Set of Requests For Production *DSI Resp to PLT RFP.pdf* ..... 11 November 2021
44. Defendant Hightrak Staffing, Inc. D/B/A Hitrak Staffing, Inc.'s Answers to Plaintiff's First Set Of Interrogatories *Hightrack Ans PLT ROGS.pdf* ..... 11 November 2021
45. Defendant Hightrak Staffing, Inc. D/B/A Hitrak Staffing, Inc.'s Responses to Plaintiff's First Set Of Requests For Production *Hightrack Resp to PLT RFP.pdf* ..... 11 November 2021
46. DESJARDINS – Deposition of Ricky Desjardins ..... 14 December 2021
47. LYLES – Deposition of James Justin Lyles ..... 14 December 2021
48. MARSHALL – Deposition of William Michael Marshall ..... 14 December 2021
49. Plaintiff's Exhibit 1 *JamesJustinLyles_1.pdf* ..... 14 December 2021
50. Plaintiff's Exhibit 2 *JamesJustinLyles_2.pdf* ..... 14 December 2021
51. Plaintiff's Exhibit 3 *WilliamMichaelMarshall_3.pdf* ..... 14 December 2021
52. MATAYABAS – Deposition of Wayne Alan Matayabas ..... 15 December 2021
53. MOONEY – Deposition of Thomas Wesley Mooney ..... 15 December 2021
54. Amended Response of Defendant Crowley Government Services, Inc. To Plaintiff's First Interrogatory No. 8 *CGS Amended Response to P's Rogg No. 8 (6 Jan 2022).pdf* .....06 January 2022
55. Supplemental Response of Defendant Crowley Government Services, Inc. to Plaintiff's First Requests for Production *CGS Supplemental Response to P's First RFPs (6 Jan 2021).pdf* .....06 January 2022
56. COLLINS - Provence v. USA, et al Case Number: 2:21-cv-00965-RMG *Collins, Physician Pathologist.pdf* .....29 January 2022
57. Plaintiff's Exhibit Verble 1 *Plaintiff's Exhibit Verble 1.pdf* ..... 09 February 2022
58. FARY – Deposition of Leo A. Fary ..... 09 February 2022
59. STEWART – Deposition of Jonathan G. Stewart ..... 09 February 2022
60. VERBLE – Deposition of Dallas A. Verble ..... 09 February 2022

Exhibit I

61. NIELSEN - Expert Witness Report
Nielsen 000001-000046.pdf & *Nielsen, Marine Engineer.pdf* ..... 14 February 2022
62. YOUNT – Preliminary Expert Report Economic Damages *Yount, Economist.pdf* ..... 15 February 2022
63. WENZEL - Provence v. Detyens Shipyard, et.al. Expert Report
Wenzel Report (Wire Rope).pdf ..... 04 March 2022
64. RE: Provence v. Detyens *RE- Provence v. Detyens.eml* ..... 10 March 2022
65. NIELSEN – Deposition of Gerald Nielsen ..... 11 April 2022
66. Misc. Vessel Photos *DSI 125-273 - Photos, DSI.pdf* ..... Undated
67. Plaintiff's Exhibit Verble 10 *DallasAVerble_10.pdf* ..... Undated
68. WENZEL – Thomas Charles Wenzel CV *Wenzel, Accident Reconstruction.pdf* ..... Undated
69. Responses of Defendant Crowley Maritime Corporation to Plaintiff's First Interrogatories
Crowley Mar. Responses to Plaintiff's First.pdf ..... Undated
70. Contract Change Order Requests Re: Lifeboat Davits
Lifeboat Change Orders & Repair Docs.pdf ..... Varies
71. OSHA FOIA Document Production
OSHA FOIA Response - 2021-F-11775.pdf & *DSI 115-117 - Vessel Information.pdf* ..... Varies
72. Vessel Defendant's Document Production
Vessel Defendants 1-987.pdf, *Vessel Defendants 988-1013.pdf*, *DallasAVerble_2.pdf*, *DallasAVerble_3.pdf*, & *Ex. 16 - Vessel Defendants 960-970 (Repair Spec).pdf* ..... Varies

Exhibit I

Kenneth W. Fisher, Ph.D.

EDUCATION

University Of Sydney, Sydney, Australia.
Ph.D. (Engineering Economics Applied to Ship Design), 1973.

University Of Michigan, Ann Arbor, Michigan.
Master of Science in Eng'g (Eng'g Mechanics, Naval Arch. and Marine Eng'g), 1966.

Webb Institute Of Naval Architecture, Glen Cove, New York. Bachelor of Science (Naval Architecture and Marine Engineering), 1964.

Franklin D. Roosevelt Institute of Maritime Studies, New York, N.Y. Certificate in Admiralty & Maritime Law, 1980.

American Arbitration Association, San Francisco, California. Certificate - Advanced Commercial Arbitration Advocacy Institute, 1986.

PROFESSIONAL EXPERIENCE

Mid-2020 to Present *FISHER MARITIME LLC, Director* Derry, New Hampshire

Dr. Fisher continues to provide the training programs that he developed while at Fisher Maritime Consulting Group, as described below.[26] He also continues to provide services in the area of Expert Witness regarding Shipyard Projects, Arbitration, and Liability Assessment, also as described below.

Mid-2020 - Present ***FISHER MARITIME LLC (New Hampshire)***
1976 to mid-2020 ***FISHER MARITIME CONSULTING GROUP (New Jersey)***

Contract Management: Dr. Fisher has acted as Contract Manager or Assistant Contract Manager on behalf of commercial clients for major contracts ($5-60 million) for the construction and conversion of major vessels. Generally, this has to been for the purpose of taking over appropriate management duties for troubled contract situations. He has also assisted project teams actively involved in military, governmental and commercial vessel construction projects develop and implement project management tools for periodic assessment of the contractually-required performances of all parties to the contract.

Project Management Training: Dr. Fisher has developed and regularly presents three fundamental, relevant 3-day training programs to the industry: (a) *Fundamentals of Contract Management for Ship Construction, Repair and Design;* (b) *Shipyard Management of the Customer and Contract,* and (c) *The Port Engineer's Course.* Since 1988, those training programs have been presented in 22 countries nearly 500 times to more than 6000 representatives of about 500 commercial firms and government agencies from 25 countries. Many organizations worldwide have had Dr. Fisher repeat the programs every few years for new staff members.

[26] Starting in 2020, training programs have been presented by video. The prior ones were all on-site presentations at worldwide locations.

Shipyard Projects: Planning and Management: In 2020 Dr. Fisher's book was published: *Shipyard Projects: Planning and Management – Insights, Lessons and Guidance.* Work Boat World magazine stated: "This brilliant book is exactly what it is described as on its cover. It should be read, studied and carefully digested by anyone in any way involved with ship design, building, renovation, repair or modification projects. In other words, by anyone doing business with a shipyard irrespective of whether they be naval architect, marine engineer, ship-builder, ship-repairer, equipment or material supplier, ship-owner, financier or maritime lawyer. Those who digest Dr. Fisher's immensely valuable advice will undoubtedly save themselves, their customer, employer, client or whoever many times the price of the book, or the time taken to study it. This … is one of the best, most useful and most valuable books ever reviewed on these pages. It is in fact absolutely invaluable!"

Expert Witness - Shipyard Projects: Dr. Fisher has testified in many courts, including British Columbia province court, in contract matters, as well as before the U.S.D.O.T. Board of Contract Appeals and the Armed Services Board of Contract Appeals on behalf of defendants and plaintiffs. He has been accepted as an expert in shipbuilding practices, shipbuilding contracts, naval architecture, marine engineering and related areas. See also *Litigation Support* and publications, below.

Planning: Since 1976, under Dr. Fisher's direction, the firm has assisted the international maritime industry in the planning, development, contracting, management and settlement of projects having individual values of hundreds of millions of dollars.

Arbitration: As an Arbitrator for the American Arbitration Association and for private parties, Dr. Fisher has conducted over 160 days of arbitration hearings between ship owners, shipyards and subcontractors involving over 70 vessels in which claims exceeded $20 million.

Shipyard Claims & Rebuttals: Dr. Fisher has prepared multiple analyses of shipyard projects and written or co-authored claims by shipyards for cost and schedule impact allowances. The claim amounts have ranged from over $300 million down to about $5 million. He has also analyzed shipyard claims and prepared analytical rebuttals to them on behalf of vessel owners and government agencies. Together, the claims and rebuttals have focused, among others, on projects for: (i) FPSO conversion from VLCC; (ii) semi-submersible production rig conversion; (iii) conversion of barge-carrying vessel to offshore construction vessel; (iv) construction of three large ferries for NYC; (v) construction of a jack-up rig; (vi) construction of three large ferries for Washington State; (vii) conversion of tanker to fish factory vessel; (viii) reconstruction of fire-damaged mega yacht; (ix) construction of two double-hull VLCCs; (x) construction of a large sludge carrier; (xi) upgrades and modification to large ice breaker; (xii) construction of coastal passenger vessel; (xiii) enlargement and conversion of major research vessel; (xv) upgrade and conversion of auxiliary naval vessel; and (xiv) overhead costs for conversion of shipyard to digitally-controlled production capabilities.

Litigation Support: In support of contract litigation, Dr. Fisher and other members of the firm acting under his direction have rebutted, or developed and asserted, several dozen contract claims pertaining to ship construction, repair and design. On numerous occasions, he has been prepared to testify as expert witness when the matters were settled on the basis of the reports he and his colleagues had prepared.

Contract Development: Dr. Fisher has been the primary drafter of a number of contracts for ship construction and conversion/modification. The drafting includes reviews and, if necessary, modifications to the specifications and drawings prepared by naval architects to ensure seamless compatibility between all elements of the contract.

EDUCATION

University Of Sydney, Sydney, Australia.
Ph.D. (Engineering Economics), 1973.

University Of Michigan, Ann Arbor, Michigan.
Master of Science in Eng'g (Eng'g Mechanics, Naval Arch. and Marine Eng'g), 1966.

Webb Institute Of Naval Architecture, Glen Cove, New York. Bachelor of Science (Naval Architecture and Marine Engineering), 1964.

Franklin D. Roosevelt Institute of Maritime Studies, New York, N.Y. Certificate in Admiralty & Maritime Law, 1980.

American Arbitration Association, San Francisco, California. Certificate - Advanced Commercial Arbitration Advocacy Institute, 1986.

Other Positions and Prior Experience

1996 - 2000 ***Webb Institute***
Glen Cove, New York

INDUSTRY PROFESSOR for M.Sc. Program (Ocean Technology and Commerce)

1973 - 1976 ***John J. McMullen Associates, Inc.***
New York, New York

DIRECTOR, TRANSPORTATION SYSTEMS (1975 - 1976)
Transportation Sciences Division

SENIOR SYSTEMS ANALYST (1973-1975)
Management Sciences Division.

1972 - 1973 ***Kenneth W. Fisher, Consultant***
Tokyo, Japan

INDEPENDENT CONSULTANT to tanker designing and constructing shipyards in Japan and Korea.

1969 - 1972 ***The University of Sydney***
Sydney, Australia

LECTURER (Associate Professor)
Department of Mechanical Engineering

1969 - 1972 ***University of New South Wales***
Sydney, Australia

LECTURER, (Assoc. Professor) (Part-Time)
School of Mechanical and Industrial Engineering

1970 - 1972 ***Kenneth W. Fisher, Consultant***
Sydney, Australia

INDEPENDENT CONSULTANT to marine and
related transportation organizations in Australia.

1967 - 1969 ***State Univ. of N.Y. Maritime College***
Fort Schuyler, New York

ASSISTANT PROFESSOR
Naval Architecture and Mechanical Engineering

Exhibit I

Memberships

Royal Institution of Naval Architects (Fellow).
Society of Naval Architects and Marine Engineers (Life Member).
American Society of Naval Engineers (Member).

Books and Papers (partial listing)

Section A -- Ship Construction and Design
Section B -- Liability and Marine Risks

Section A -- Ship Construction, Repair and Design

(1) "CHALLENGES OF MANAGING SHIPYARD PROJECTS", *International Journal of Maritime Engineering*, Royal Institution of Naval Architects, UK, October 2021.

(2) "SHIPYARD PROJECTS: PLANNING & MANAGEMENT – INSIGHTS, LESSONS, AND GUIDANCE". (Book) Fisher Maritime LLC, Derry NH. July 2020

(3) "THE IMPACT OF CONTRACTS ON SHIP DESIGN PREPARATION", *Journal of Ship Production and Design*, Society of Naval Architects and Marine Engineers , USA, vol. 28, No. 2, page 87, May 2012.

(4) "MECHANISMS FOR SHIPYARD PROJECT MANAGEMENT", *Ship Production Symposium*, Society of Naval Architects and Marine Engineers, Fort Lauderdale, USA, October 2006.

(5) "SHIPBUILDING SPECIFICATIONS: BEST PRACTICE GUIDELINES", *International Journal of Maritime Engineering*, Royal Institution of Naval Architects, UK, March 2004.

(6) "SHIPBUILDING CONTRACTS AND SPECIFICATIONS", Chapter 9 of *Design and Construction of Steel Merchant Ships.* Society of Naval Architects and Marine Engineers, Jersey City, NJ, September 2003.

(7) "MODERN CONTRACTS FOR MODERN YACHTS" *Proceedings* of the Modern Yacht Conference, Royal Institution of Naval Architects, Southampton, UK September 2003.

(8) "AN OWNER'S MANAGEMENT OF SHIP CONSTRUCTION CONTRACTS" Royal Institution of Naval Architects conference *Newbuild 2000: The Role of the Naval Architect.* London, Oct. 1995.

(9) "RESPONSIBILITIES PERTAINING TO DRAWING APPROVALS DURING SHIP CONSTRUCTION AND MODIFICATION" Society of Naval Architects and Marine Engineers, Great Lakes & Great Rivers Section, Cleveland, January 1991. Published in by the Society in *Marine Technology,* Nov. 1991

(10) "WHY EXCUSES TO IGNORE THE CONTRACT DO NOT FLOAT UPRIGHT" *Shipyard Technology News.* London, March 1996, Also published in *Society of Naval Architects and Marine Engineers, Singapore*, 22nd Annual Journal 1997/1998.

(11) "THE MIS-MANAGEMENT OF SHIP CONSTRUCTION, REPAIR AND DESIGN" International Marine Transit Association Annual Conference, New York, October 1984.

(12) "TECHNOLOGICAL AND COST ANALYSES OF A PROPOSED ICE-BREAKING L.N.G. CARRIER PROJECT" Society of Naval Architects and Marine Engineers, San Diego, December 1987.

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(13) "ASSESSING FUTURE PROBLEMS OF THE TOWING INDUSTRY" 1986 Ocean and Coastal Towing Industry Conference, Atlantic City, NJ April 1986.

(14) "THE MANAGEMENT OF SHIP CONSTRUCTION, REPAIR AND DESIGN" Editor and Contributing Author (two of 16 chapters), published by Fisher Maritime, December 1980.

(15) "THE RELATIVE COSTS OF SHIP DESIGN PARAMETERS" Royal Institution of Naval Architects, *Trans.,* Vol. 116, 1974.

(16) "THE INCLUSION OF IMCO TANKER DESIGN CONSTRAINTS IN GENERAL OPTIMIZATION PROCEDURES" Society of Naval Architects and Marine Engineers, *Trans.,* Vol. 81, 1973.

(17) "METHODOLOGY FOR ECONOMY IN SHIP CONSTRUCTION" Korean Society of Naval Architects, Seoul, February 1973.

(18) "OPTIMIZATION CONCEPTS IN SHIP DESIGN" Royal Institution of Naval Architects, Sydney, Australia, October 1972.

(19) "ECONOMIC OPTIMIZATION PROCEDURES IN PRELIMINARY SHIP DESIGN (APPLIED TO THE AUSTRALIAN ORE TRADE)" Royal Institution of Naval Architects, *Trans.,* Vol. 114, 1972.

Section B -- Liability and Marine Risks

(20) "ASBESTOS: EXAMINING THE SHIPYARD'S RESPONSIBILITY." Fisher Maritime, August, 2001.

(21) "ASBESTOS IN SHIPBUILDING -- UNITED STATES PRACTICES, 1930's - 1970's" Editor and Contributing Author, published by Fisher Maritime, November 1998.

(22) "MARITIME PRODUCT LIABILITY" Editor of book with 13 contributing authors, published by Fisher Maritime, November 1979.

(23) "EVALUATION OF MARINE RISKS -- AN ANALYTICAL APPROACH" United States Propeller Club's North Atlantic Regional Seminar on Marine Liability, Newport, RI, April 1986.

(24) "DEVELOPMENTS IN MARINE AND SMALL CRAFT LIABILITIES" Editor and Contributing Author, (two of 18 chapters), published by Fisher Maritime, April 1983.

(25) "PRODUCT LIABILITY IN VESSEL CONSTRUCTION - REDUCING ITS POTENTIAL THROUGH CONTRACT MANAGEMENT". Seminar on Contract Management for Commercial Ship Construction and Repair, St. Louis, May 1979.p

(26) "LIABILITY AVOIDANCE IN DESIGN AND CONSTRUCTION OF STEEL MERCHANT SHIPS" Society of Naval Architects and Marine Engineers, New England, December 1979.

(27) "DYNAMIC ASPECTS OF MARINE AND OFFSHORE LIABILITIES" Editor of book with six contributing authors, published by Fisher Maritime, March 1978.

DEPOSITIONS AND TRIAL TESTIMONY
OF DR. KENNETH W. FISHER
January 2010 –December 2021

DATE	CASE
04/26/18	Joseph F. Brazan v. Lamorak Insurance, Avondale Industries, Inc., et al. Orleans Parish (LA) Civil District Court Case No. 2017-09390 • Deposition 04/26/18 in Manchester, NH
03/08/18	Anniereen L. Gelpi v. Avondale Industries, Inc., et al. Orleans Parish (LA) Civil District Court Case No. 2017-8859 • Deposition 03/18/18 in New Orleans.
03/07/17	Michael Spielman v. Allcraft Tool & Supply Co., et al. Los Angeles County (Calif) Case No. BC618010, JCCP No. 4674 • Telephonic Deposition by R. Moussa, Esq. in Dallas TX.
01/24/14	Bender Shipbuilding and Seacor Marine v. Caterpillar, Inc. Mobile County, Alabama Circuit Court, Case CV-2010-900126 • Deposition, 01/24/14. Mobile, AL.
10/22/13	Torre J. Woods v. HO Sports Company, Case No. 12-2-08809-3 State of Washington Superior Court Pierce County • Deposition, 10/22/13. Florham Park, NJ.
09/24/13	Emily Olds v. MacGregor Yacht Corporation, Case 378-2011-00098554 San Diego County (Central Div'n) California Superior Court • Deposition, 09/24/13. San Diego, CA.
04/09/13	Gregory Mulholland v. City of New York., US District Court, Southern District of NY, Case No. 09cv6329 (AKH) • Trial Testimony, 04/09/13 -- New York, NY.
11/09/12	Joyce Wright v. Sue Gears Superior Court of Vermont, Chittenden Unit, Civil Division S442-11 CnC • Deposition, 11/09/12-- Manchester, NH..
03/28/11	Nicholette C. Bell v. Mastercraft Boat Company and Jerry Montz Butte County California Superior Court, Chico, CA, Case No. 140630 • Trial Testimony, 03/28-29/11, Chico, Calif.
03/03/11	Charles Willis v. Allis Chalmers, York Int'l, et al. United States District Court Eastern Penna., Civil Action No. 2:10-cv-61167 • Deposition, 03/03/11-- Florham Park, NJ.
02/16/11	James Bagwell v. Spraylat International & Hatteras Yachts (Brunswick Corp.) Carteret County, Superior Court of NC, File No. 08-CVS-1528 • Deposition, 02/16/11-- Morris Plains, NJ.
02/09/11	John McGarrigle v. Mercury Marine (Brunswick Corp.) United States District Court New Jersey, Civil Action No. 1:09-cv-04625-NLH-JS • Deposition, 02/19/11-- Florham Park, NJ.

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02/07/11 Robert Greco v. Associated Auto Parts, Borg Warner, et al.,
Middlesex County, Superior Court of NJ, Docket No. L-10372-09-AS
- Deposition, 02/07/11-- New Brunswick, NJ.

01/13/11 Nicholette C.Bell v. Mastercraft Boat Company, et al.,
Superior Court of Calif., Butte County, Case Nos. 140630, 142416, 142417
- Deposition, 01/13/11 – Sacramento, CA.

01/11/11 Randye Guzi v. TWFM Ferry & New York Water Taxi,
Supreme Court of New York State, Kings County, Index No. 38235/06
- Trial Testimony, 01/11/11 – Brooklyn, New York.

07/06/10 Maximilian Stanton v. Buchanan Marine, et al., US District Court,
Southern District of NY, Civil Action No. 1:08-cv-09713-LBS
- Continuation of Deposition, 07/06/10 -- New York, NY.

05/28/10 John S. Sunday v. Advocate Mines, York Refrigeration, et al.
Commonwealth of Massachusetts Middlesex Superior Court No. Civ. 08-0689
- Deposition, 05/28/10 -- Florham Park, NJ.

03/26/10 Maximilian Stanton v. Buchanan Marine, et al., US District Court,
Southern District of NY, Civil Action No. 1:08-cv-09713-LBS
- Deposition, 03/26/10 -- New York, NY.

03/02/10 Evan E. Davis v. Mark Gabrielli, Mako Marine Inc., et al., Somerset County
Superior Court of NJ, Docket No. SOM-L-000406-07
- Deposition, 03/02/10 -- Linden, NJ.

Compensation: Fisher Maritime LLC of New Hampshire is compensated $435.00 for each hour of Dr. Fisher's time, including all consulting, studying, research, deposition and testimony time, subject to a four percent (4%) increase in each twelve-month period commencing July 1, 2022.

Exhibit I